TECHNICAL MEMORANDUM 5b – ENVIRONMENTAL AND COMMUNITY IMPACTS MULTI-COUNTY GOODS MOVEMENT ACTION PLAN

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E.1 Introduction

Technical Memorandum (TM) 5b outlines the environmental issues currently associated with Southern California's goods movement network. The specific impacts associated with these issues are numerous and widely varied throughout the region. This memo looks at the various existing environmental issues with the intent to provide a regional perspective of existing and potential impacts from freight movement. These impacts include: quality of life, environmental justice, traffic congestion, land use and compatibility changes, air quality and health, visual, noise and vibration, environmental justice, water quality and wetlands, HAZMAT, and safety issues. By providing a regional perspective of freight related environmental impacts, TM5b will serve as the necessary basis for identifying environmental mitigation measures in the evaluation of specific strategies for improving goods movement. Building upon the information presented in this memo, the strategies will be developed as a part of Task 6, and a list of good practice mitigation measures will be identified as a part of Task 7.

This TM builds on significant work by many international, national, state and regional agencies to minimize the environmental impacts associated with goods movement. Many studies, such as the South Coast Air Quality Management District (SCAQMD) Multiple Air Toxics Exposure (MATES-II) Study, validate that increasing goods movement activities to date have contributed to congestion, elevated air pollutant emission levels, and other community impacts such as safety, land use conflicts, noise, intrusion on communities.

This TM is intended to be a summary of the environmental and community impacts in the study area that result from current goods movement and could potentially result in the future. Thorough impact analyses will be conducted in accordance with state and federal environmental mandates (e.g. California Environmental Quality Act and National Environmental Policy Act) for specific programs or projects when proposed. This will ensure all impacts are sufficiently addressed and that the public is appropriately engaged. Specific programs or projects are not within the scope of this study. Strategies (as opposed to specific programs and projects) to be proposed as the final product of this Multi-County Goods Movement Action Plan (MCGMAP) will be broader in approach; therefore the characterization of impacts in this TM focuses on the regional affects of goods movement.

It should be noted that during the outreach process (conducted as a part of Task 2), stakeholders within the MCGMAP region voiced strong concern over the impacts of goods movement on the environment, their communities, and their overall quality of life. Due to the serious environmental, public health impacts and traffic congestion issues, communities and policy makers have begun to demand mitigation and to challenge proposals for infrastructure capacity enhancement. The stakeholders within the affected communities are opposing key infrastructure improvement projects that could improve current circumstances, they are calling for slower growth and mitigation of existing impacts.

The stakeholder outreach process has highlighted the critical need to address community and stakeholder concerns regarding the environmental and community impacts of goods movement while pursuing infrastructure improvements. The mitigation of direct and indirect impacts of specific goods movement projects or related activities must become a part of the process from the early stages.

This technical memorandum (TM) will:

1. Present the environmental framework in which the MCGMAP is operating – key regulatory framework and data.
2. Discuss the prominent environmental and community impacts confronted by goods related activities within the study area, and explain why these issues are important within the study area.
3. Discuss some of the potential operational and cumulative resource impacts from goods movement projects should they be proposed.

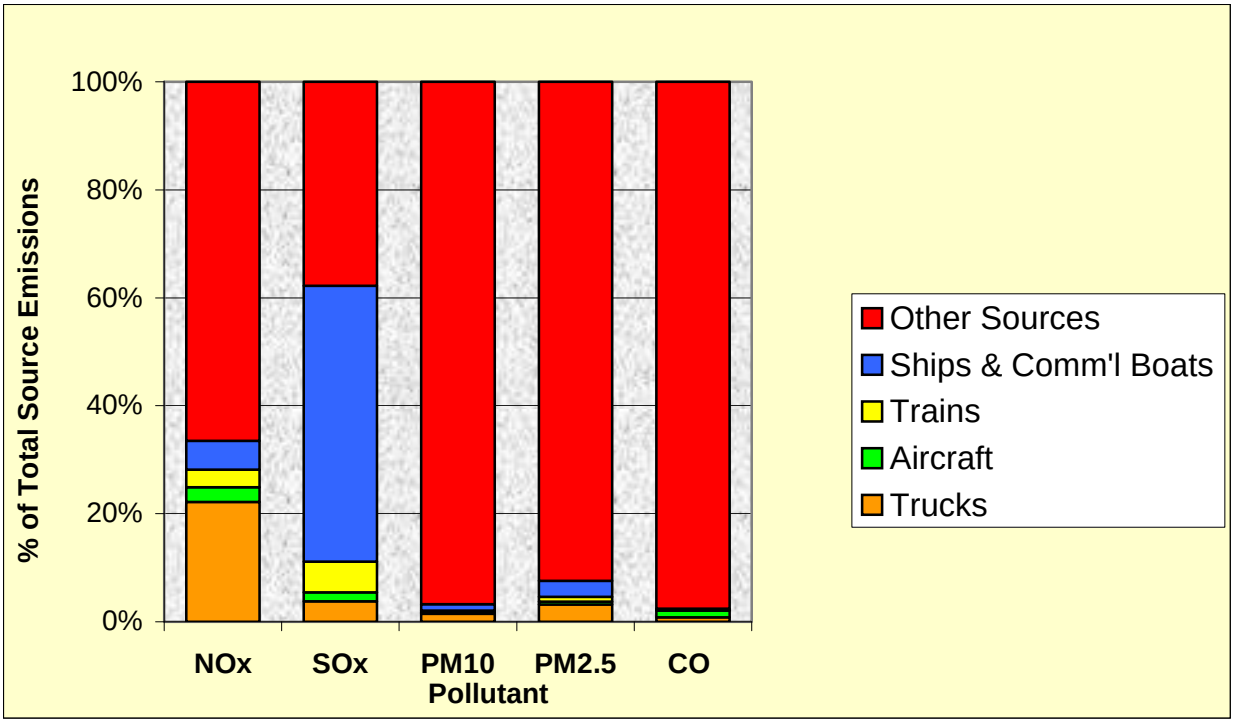
By presenting the information described above, this TM will serve as the foundation for the identification of a set of good practice measures for mitigating the effects of goods movement on local communities and the environment. These mitigating strategies will be identified as a part of Task 7.

E.2 Regulatory Background

The study area covers a large geographic area that contains a wide variety of topography, air, water, and other environmental characteristics. Due to its unique geographic location, the state's environmental quality and control is shared between international, federal, state, and regional agencies. There are approximately 30 agencies with jurisdiction over a broad range of environmental impacts. Landmark environmental legislation includes the Clean Air Act, Clean Water Act, and Noise Control Act; however, it is the reduction of air pollutants via cleaner fuels, operational changes, and technological improvements that has received the primary focus. A comprehensive list of the agencies, jurisdictions, and responsibilities is included in the body of the technical memorandum.

While these agencies establish environmental standards, the travel demand resulting from rapid population and goods movement growth with their resulting travel demand are challenging the study area's ability to mitigate the related impacts on its natural resources and community neighborhoods. California's largest metropolitan region – and largest goods movement contributor in the state – is the South Coast Air Basin (SCAB). The area is comprised of 6,480 square miles, 43 percent of California's population, and contributes 29 percent of the State's total criteria pollutant emissions.[1] Pollutant concentrations in parts of this air basin are among the highest in the Nation.[2] The study area is in attainment with the required levels of carbon monoxide (CO), nitrogen oxides (NO_2), and sulfur oxides (SO_2). However, the study area is in non-attainment with state air quality standards for ozone and particulate matter.[3] Emissions from goods movement in relation to all emission sources in the SCAB are presented below in Figure 1. Emission sources other than goods movement sources are also significant contributors to the study area's air quality concerns.

Figure 1
2005 Estimated Annual Average Emissions in SCAB



Source: *Final 2003 Air Quality Management Plan.* South Coast Air Quality Management District.

More efforts are required to bring the study area into attainment for all air quality standards to the benefit of the environment and those who live here. However, it is important to note that there has been significant progress in mitigating and reducing environmental and community impacts. Without the progress to date, the study area would be in far worse condition. For example, CARB estimates that due to air quality regulations adopted through October 2005 the following emission levels in diesel particulate matter (PM), NOx, and SOx from years 2001 to 2020 will result in[4]:

- Substantial diesel PM emissions reductions from trucks (84%), harbor craft (53%), and cargo handling equipment (75%); a minor rail reduction (4%); and a substantial increase from ships (199%).
- Substantial NOx emissions reductions from trucks (61%), harbor craft (48%), cargo handling equipment (71%), and rail (32%); and a substantial increase from ships (168%).
- Substantial SOx emissions reductions from trucks (80%), harbor craft (75%), and rail (99%); no change in cargo handling equipment emissions; and a substantial increase from ships (200%).

While the reductions to the domestic mobile source emissions are expected to be significant, this is not a guarantee that the study area will meet emissions budgets or attain federal and state standards for PM2.5[5] or ozone. This issue will be further addressed in Technical Memo 7.

It should also be noted that the gains in known health impacts associated with a reduction in domestic goods movement air emissions are less substantial due to anticipated increases in air pollutant emissions from international ships.

Ongoing efforts – both by regulatory agencies and private industry – will help to minimize the impacts as the region continues to reap the effects of increased growth. For example, such efforts in regards to reducing pollutant emissions include: dockside cold ironing, cleaner fuel requirements, extended hours for port operations, voluntary vessel speed reductions, truck idling limits, use of diesel-hybrid switch locomotives, and rail grade separations.

Air quality standards and regulations are dynamic. Evolving environmental science and emerging data concerning pollutant impacts are prompting new policies and standards. Some recent emerging issues and developments concerning the Study Area's air quality relating to the goods movement network are:

- First-time area designations for PM2.5 promulgated in early 2005 by the U.S. EPA. The South Coast Air Basin is designated as nonattainment for PM2.5 (currently, the other basins within the study area are in attainment).[6]

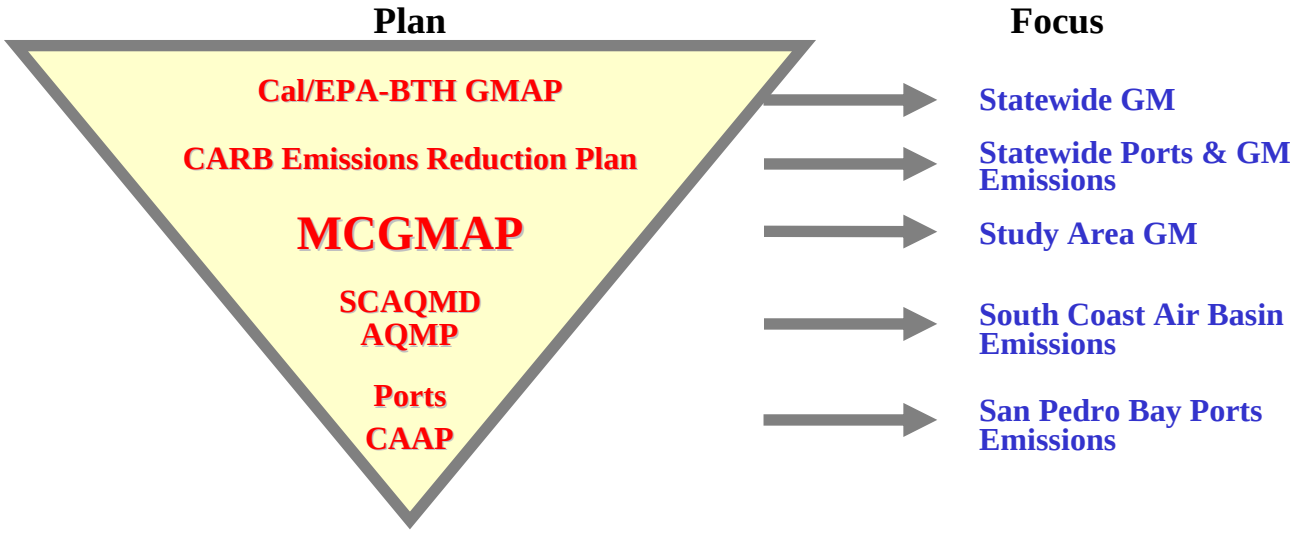
- The U.S. EPA has recently amended emission standards for nitrogen oxides (NOx) for new commercial aircraft engines. A 16% NOx source reduction (or increase in stringency) is expected between the old and new engine standards.[7]

- Effective January 1, 2007, domestic and international ships operating auxiliary diesel engines (Category 2 engines) and diesel-electric engines (Category 3) will be required to use cleaner burning diesel when approaching within 24 nautical miles[8] of the California coast.

- The Office of the United States Trade Representative (USTR) has proposed the United States-Thailand Free Trade Agreement (FTA).[9] An agreement with Thailand, which is currently the United States' 20th largest trading partner, would significantly increase trade in goods and services, thereby creating a potential significant impact on the goods movement system in the study area, resulting in additional local air quality concerns to be addressed.

California agencies continue to aggressively address goods movement emissions. Four landmark plans are currently shaping the goods movement industry within the study area as follows: (1) California EPA (Cal/EPA) and the Business, Transportation, and Housing Agency (BTH) *Goods Movement Action Plan Phase II Progress Report: Draft Framework for Action* (March 2006), (2) California ARB (CARB) *Emission Reduction Plan for Ports and Goods Movement in California* (March 2006), (3) SCAQMD *2003 Air Quality Management Plan*, and (4) the Ports of Long Beach and Los Angeles *San Pedro Bay Ports Clean Air Action Plan* (Draft – June 2006). This Multi-County Goods Movement Action Plan (MCGMAP) will supplement these agency plans. The sphere of influence of each plan is presented in Figure 2 below. Key points of each plan (excluding the MCGMAP) follows.

Figure 2
Agency Plans Sphere of Influence



Source: Jones & Stokes, 2006.

The Cal/EPA-BTH Goods Movement Action Plan is a statewide goods movement action plan proposed by the Schwarzenegger Administration to generate jobs, increase mobility and relieve traffic congestion, improve air quality and protect public health, enhance public and port safety, and improve California's quality of life. The plan addresses goods movement infrastructure and operations, as well as air quality emission reductions efforts. Goals include: reduce emissions to year 2001 levels by 2010;continue reducing emissions past year 2001 levels until attainment of applicable standards is achieved; reduce diesel-related health risks by 85% by year 2020; and ensure sufficient localized air toxics risk reductions in each affected community. The $15B action plan proposes funding via $1.95B in previously committed public funding and proposed bond funding (S.B. 1266) to include $2B for trade corridor improvement projects and $1B for air quality improvements. A key component of the plan is the simultaneous and continuous improvement in infrastructure and mitigation. A preliminary working list of candidate projects has been developed based on criteria. Examples of goods movement infrastructure projects include dock-rail facilities, the Alameda Corridor East, and rail capacity improvements.

The CARB Emissions Reduction Plan focuses on statewide emission reductions specifically from ports and the goods movement industry. This plan focuses solely on air quality per CARB's legislative purview. While the plans are consistent with one another, the Emissions Reduction plan is broader than the Cal/EPA-BTH plan in terms of air quality efforts. Goals include: reduce total statewide international and domestic goods movement emissions back to year 2001 levels or below by year 2010; reduce statewide diesel particulate matter health risk from goods movement by 85% by year 2020; reduce NOx emissions from international goods movement in the South Coast by 30% from projected year 2015 levels, and 50% from projected year 2020 levels; and apply plan strategies statewide to aid all regions in attaining air quality standards. Measures identified in the plan include more stringent emissions standards, cleaner fuels, shore power, speed reduction of ships, engine upgrades and retrofits, and emission control devices. Over

a fifteen-year period, the plan is expected to cost between $6B and $10B and result in $34B to 47B in economic benefits in terms of the savings via the avoidance of adverse health impacts. Funding of the plan assumes all industries involved must share in investment costs, and is generally unfunded by CARB itself.

The SCAQMD *2003 Air Quality Management Plan (AQMP)* is a mandated document that develops emissions budgets for State Implementation Plan (SIP) conformity with state and national ambient air quality standards. AQMD's air pollution control strategy focuses on controlling man-made sources through technologies and management practices, and relies on mobile source control measures developed by CARB. The current 2003 AQMP focuses on demonstrating attainment with the federal PM10 ambient air quality standard by 2006 and with the federal 1-hour ozone in year 2010. The development of the 2007 Plan is currently in progress and will focus in part on new federal 8-hour ozone and PM2.5 standards. Large emission reductions NOx, Sox and PM will be needed to attain by statutory deadlines. The overall reductions necessary for demonstrating attainment of the PM2.5 would be 50% NOx reduction from current levels by 2020 and 70% SOx reduction by 2014. AQMD's approach is to pursue the most effective possible set of air quality improvement strategies while maintaining a healthy economy.[10]

The *San Pedro Bay Ports Clean Air Action Plan* (CAAP) is the most recently developed plan to target goods movement emissions at the Port of Los Angeles (POLA) and Port of Long Beach (POLB), and has been developed jointly by the ports with the input of SCAQMD, CARB, and EPA. The CAAP establishes port area emissions standards. It targets trucks, ships, rail, harbor craft, and cargo handling equipment for various control measures and initiatives, including: improvements to engine performance standards, alternate fuels and power, and emissions reductions; a Technology Advancement Program; infrastructure and operational efficiency improvements; and tracking and monitoring. The CAAP is to be reviewed for progress and updated annually. The CAAP targets the annual reduction of specific pollutants and anticipates a reduction in NOx by 13,090 tons per year (TPY), diesel PM by 1,242 TPY, and SOx by 2,721 TPY. This is a 5-year program at an estimated cost of $1.98B[11], committed funding of $394.4M, and a potential shortfall of approximately $1.6B. This shortfall is likely to be addressed in part by the state's proposed bond measure (S.B. 1266) if voters pass the measure in late 2006.

E-3 Environmental & Community Impacts

Quality of Life

The general quality of life for area residents is greatly affected by the goods movement network. While quality of life is not an environmental impact per se, it is important because so many individual environmental impacts influence the ability to enjoy one's living conditions. Quality of life is primarily affected by the following environmental impacts: traffic congestion, land use compatibility and land use changes, air quality and related health impacts, visual and noise impacts, and safety. These impacts affect people in their residences, schools, and public spaces. An overview of these impacts is addressed below. Further discussion of the impacts is in the technical memorandum.

Traffic Congestion

Ninety-nine percent of the trips taken within the MCGMAP study area occur on the highway and arterial network. This network is comprised of over 9,000 freeway lane miles and more than 42,000 arterial lane miles, accounting for over 54 million vehicle trips per day on a network that has seen little added capacity in comparison to population growth. Both passenger vehicles and trucks compete for space on the roadway network. Truck vehicle miles traveled (VMT) is expected to approach 39.1 million in year 2030, a 63% increase from 2000.[12] Automobile traffic in 2030 is expected to approach 449.7 million, an increase of 33%, and will account for 92% of the total VMT. The total daily delay from congestion in 2000 was estimated at 2.2 million person-hours, and could reach 5.4 million person-hours by 2030.[13]

Rational driver behavior predicts that drivers faced with increasing corridor congestion will divert from their original route in an attempt to find a more efficient path to their destination. Once an alternate path is established, it becomes a regular pattern. One effect of this behavior is increasing diversion of truck traffic from highways to city surface roadways that run adjacent to or through communities causing increased surface street congestion. As surface street congestion increases, so do idling and emission levels. However, it has been asserted a ten percent gain in lane capacity could be achieved by shifting thirty trucks per hour from the freeway to railway.[14] The benefit could be felt by commuters in travel time savings on freeways and by neighborhoods in potentially less truck traffic diversion from freeway corridors.

Land Use & Compatibility Changes

Buffer zones between incompatible land uses are being squeezed as (a) goods movement facilities expand and encroach into residential neighborhoods, and (b) residential development due to population growth (and a need for affordable housing) expands thus encroaching onto goods movement facilities. Concurrently, high land costs in the developed areas surrounding ports, airports, intermodal terminals, and truck terminals have forced the freight transportation industry to look to outlying areas for facility growth. This coupled with the region's spreading development patterns has caused regional freight distribution patterns that emphasize peak period congestion and high levels of freight VMT.[15] However, the use of brownfields located near ports in some areas of the country is receiving more consideration as the goods movement sector continues to grow. Brownfield reuse provides the warehousing and distribution center

industry more opportunities for affordable and developable land, and easy access to markets, transportation modes, and labor supply.[16]

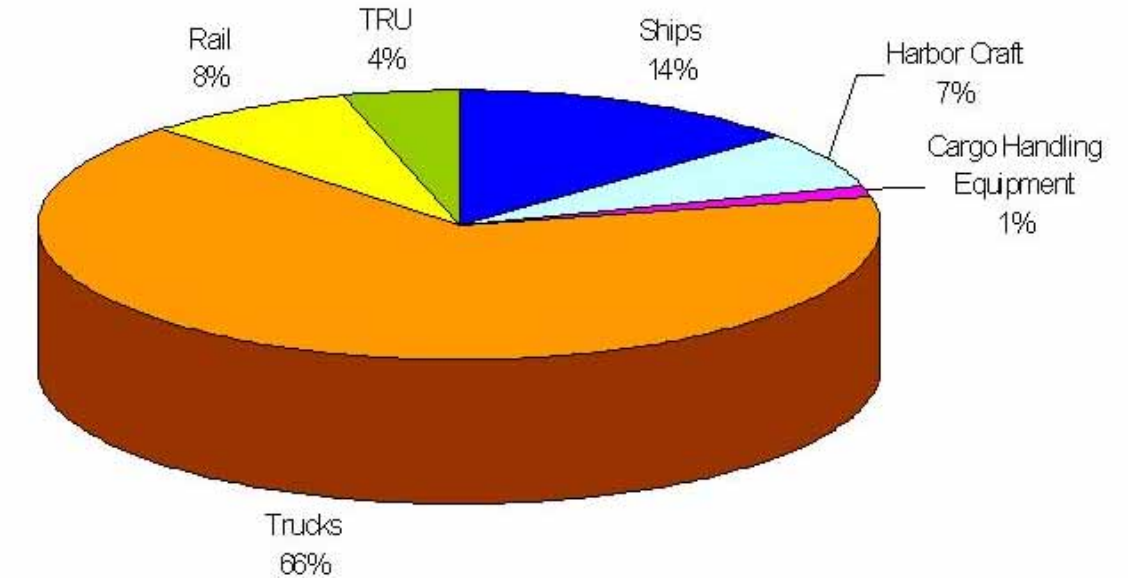
Air Quality & Health

Health Effects of Air Quality

Ambient air quality standards are essentially "health-based standards." Air quality is by far the most significant potential impact to communities throughout the study area, the state, and beyond. Mobile source emissions that include goods movement are a major emissions contributor. The goods movement industry relies heavily on diesel fuel to power their activities.

Regional air quality is a primary concern because issues of toxic air contaminants (TACs) and ultrafine PM pose known health risks to people. A primary TAC is diesel PM, which is emitted from all source categories associated with diesel fuel combustion. Boats, trucks, and trains associated with goods movement are the primary sources of diesel PM. Seaport activities significantly affect air quality within the study area due to the congregation of these mobile sources and their resulting diesel PM emissions. As displayed in Figure 3, statewide 2001 diesel PM emissions inventory from ports and goods movement were approximately 57 tons per day, with modal contributions as follows: 66% truck emissions, 8% rail, 14% ships, 7% harbor craft, 4% transport refrigeration units (TRU), and 1% cargo handling equipment.[17]

Figure 3
Diesel PM Statewide 2001 Emissions from Ports and Goods Movement



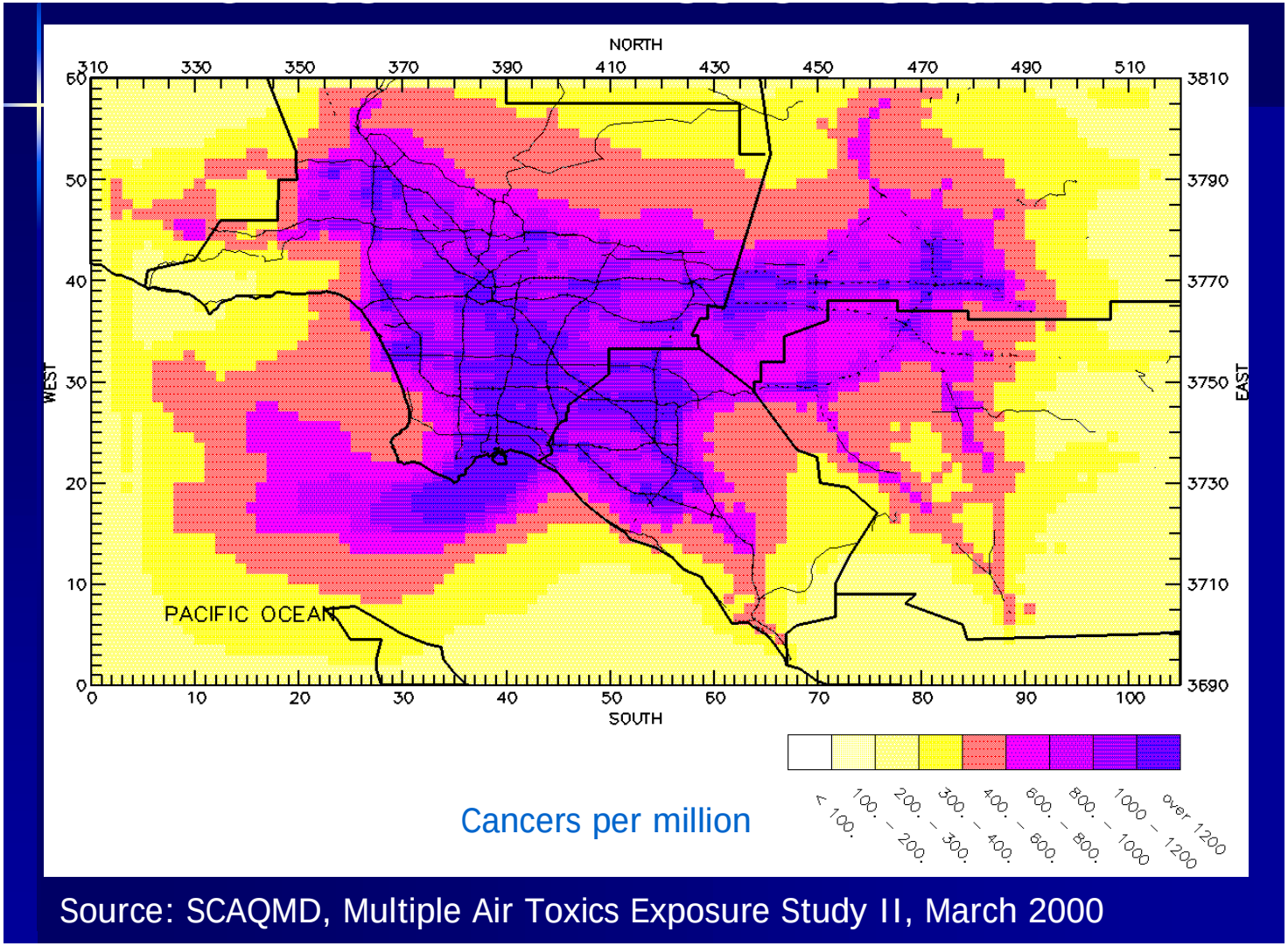
Source: Proposed Emission Reduction Plan for Ports and Goods Movement in California. California EPA and California Air Resources Board. March 21, 2006.

Diesel PM is a cause for special concern to human health because 50-90% of the particles are very small (i.e., *ultrafine*) and can readily enter into and deposit within the lungs and pass through the bloodstream to

the cellular level. However, it should be noted that ultrafine particulate matter is not exclusive to diesel emissions – ultrafine particles originate from any combustion process using any fuel, including gasoline, compressed natural gas (CNG), and liquid natural gas (LNG). Combustion sources other than mobile sources include stationary, industrial, occupational, and atmospheric conversion.[18] Independently published research reinforces the health risks associated with emissions by establishing a diesel exhaust-cancer connection. In more than 35 studies involving railroad workers exposed to occupational diesel exhaust, the excess risk of lung cancer is consistently elevated by 20-50%.[19]

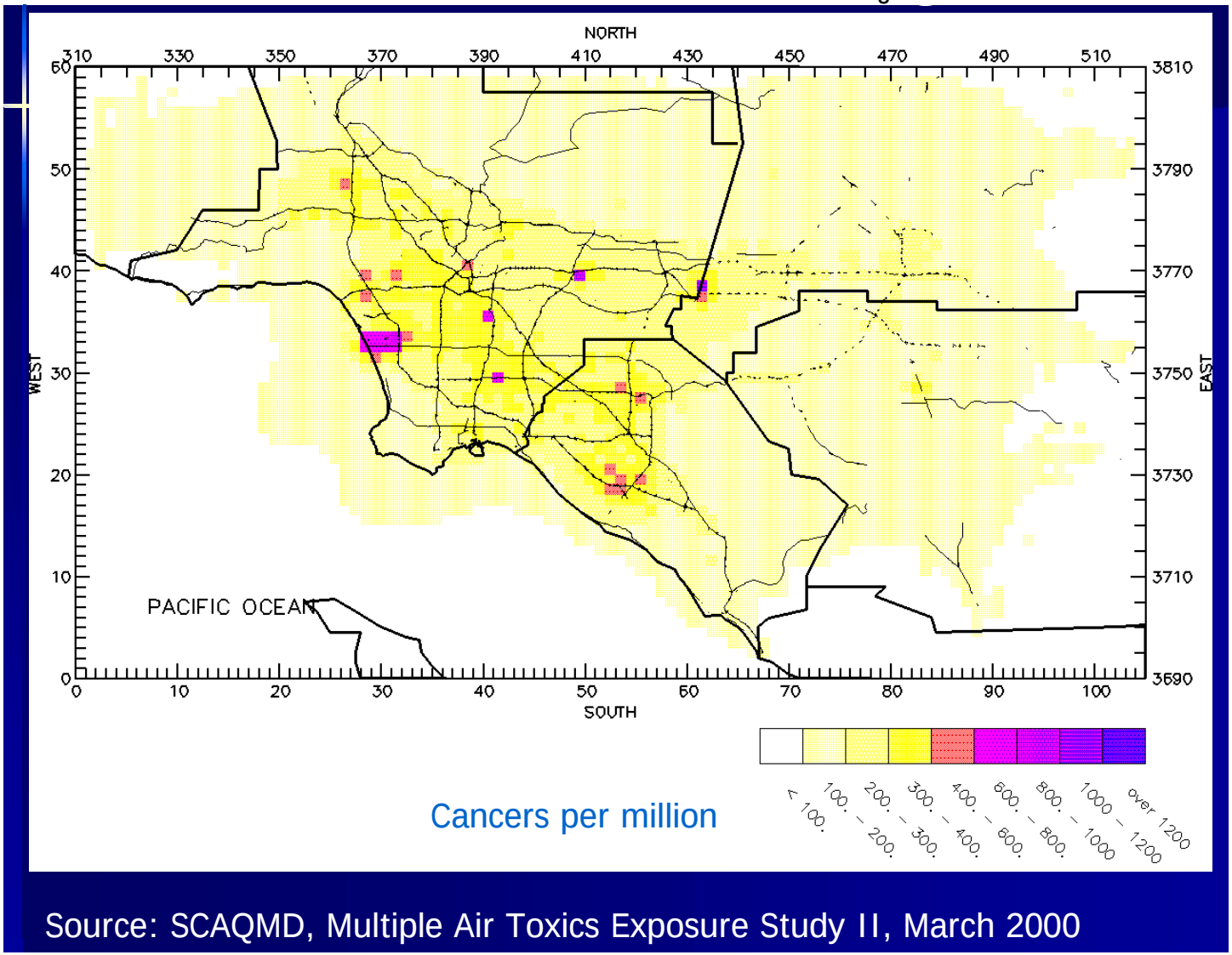
According to the South Coast Air Quality Management District Multiple Air Toxics Exposure (MATES-II) Study, diesel particulates account for 71% of the cancer risks (1,400 in one million) relating to pollutants in the South Coast Air Basin. For comparative purposes, Figures 4 and 5 display the cancer risk from airborne toxics with and without diesel emissions for the counties of Los Angeles, Orange, Riverside, San Bernardino, and Ventura.[20] Based on a comparison of Figures 4 and 5, and a cancer risk of 1,400 per million; individuals in areas of maximum risk are 14 times more likely to contract cancer due to diesel emissions.

Figure 4
Estimated Risk of Cancer from All Toxics: All Emission Sources



Source: SCAQMD, Multiple Air Toxics Exposure Study II, March 2000

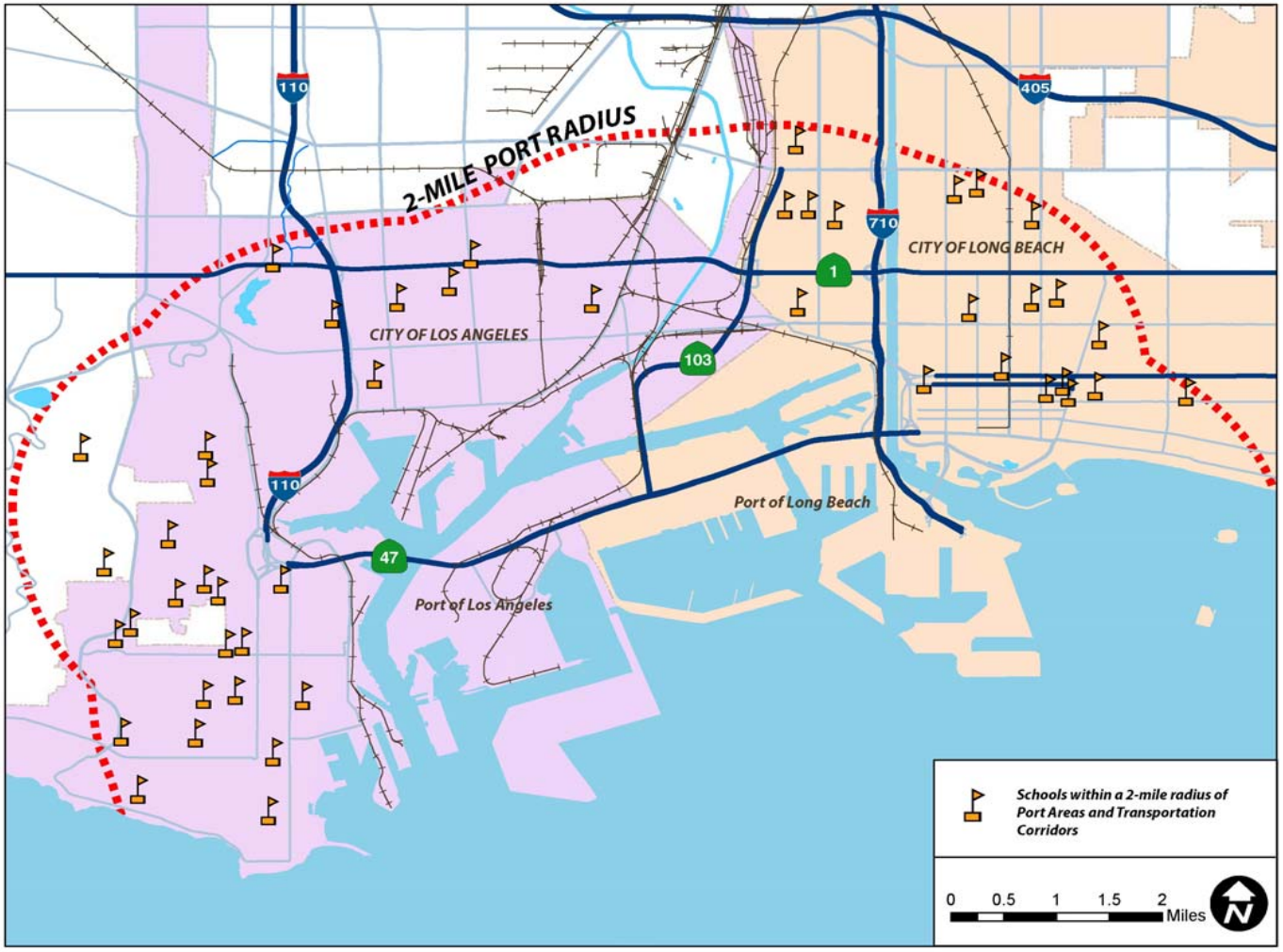
Figure 5
Estimated Risk of Cancer from Airborne Toxics: Excluding Diesel



Source: SCAQMD, Multiple Air Toxics Exposure Study II, March 2000

The Keck School of Medicine of USC also found harmful health effects cause by diesel PM, including increased incidences of: asthma, preterm and low birth weight babies; cardiac birth defects, thickening of arterial walls, oropharyngeal (mouth and throat) cancer, and slowed lung development in children. [21] Recent CARB analysis shows 5,400 premature deaths (up to 14 years premature) each year in the South Coast Air Basin just due to PM2.5 pollution. CARB previously estimated that 2,400 people die prematurely each year of that in the South Coast Air Basin. There is evidence that vehicle-related pollutants decrease to "near background levels" within about 300 meters (approximately 1,000 feet) of freeways.[22] The issue nevertheless raises concern in areas near goods movement facilities and corridors where people live and their children go to school. Taking the study area's ports for example, forty-six schools are located within two miles of either the San Pedro Bay ports as displayed in Figure 6.

Figure 6
Schools Located Within a 2-Mile Radius of San Pedro Bay Ports



Source: 2000 U.S. Census TIGER data

NOx also poses health threats to individuals, albeit indirectly. NOx precursor emissions are required to form ground-level ozone (O_3) as well as PM2.5.[23] Ozone can affect the health of individuals by aggravating asthma and causing lung tissue inflammation. Children and the elderly are the most susceptible, although the U.S. EPA estimates that ozone can result in a 15 to 20% temporary decrease in lung capacity in some healthy adults.[24]

Goods Movement's Role in Air Quality

Commercial aircraft emissions are a growing segment of the transportation emissions inventory due to increasing air traffic demand. This growth is occurring at a time when other significant mobile and stationary sources are drastically reducing emissions, thereby accentuating the growth in aircraft emissions. Recently, the Federal Aviation Administration (FAA) reported that flights of commercial air carriers are expected to increase by 34% from 2002 to 2020.[25] According to the FAA, the combined emissions from aircraft and GSE typically represent approximately three to five percent of emissions regulated under State Implementation Plans (SIP) nationwide.[26] Aircraft emissions data within SCAB is presented in Table 5.

Table 5
Estimated 2005 Annual Average Aircraft Emissions in SCAB

	Pollutant (Tons per Day)				
	NOx	SOx	PM10	PM2.5	CO
Aircraft	26.53	0.95	0.65	0.65	50.79
TOTAL All Sources	975.3	58.48	291.95	112.49	4100.19
Aircraft % of Total	2.7%	1.6%	0.2%	0.6%	1.2%

Source: South Coast AQMD 2003 Air Quality Management Plan

Ports have such a significant impact because three major modes of goods movement transportation converge there – ships, trucks, and rail. These modes predominantly use particulate-producing diesel fuel. Not only are more diesel-powered vehicles accessing the ports due to goods movement growth, but they are also spending more time there due to port capacity constraints, thereby resulting in increased diesel emissions from idling. In addition, support vehicles such as harbor craft and cargo handling equipment typically rely on diesel fuel as well. Further, ships use a low-grade diesel fuel ("bunker fuel") that contributes significantly more particulate matter than diesel used by trucks and locomotives. Ship emissions data within SCAB is presented in Table 6.

Table 6
Estimated 2005 Annual Average Ship Emissions in SCAB

	Pollutant (Tons per Day)				
	NOx	SOx	PM10	PM2.5	CO
Ships & Commercial Boats	51.88	29.89	3.59	3.32	6.19
TOTAL All Sources	975.3	58.48	291.95	112.49	4100.19
Ships % of Total	5.3%	51.1%	1.2%	3.0%	0.2%

Source: South Coast AQMD 2003 Air Quality Management Plan

The locomotive engine is the primary source of diesel emissions associated with rail, with rail support equipment and switchers also contributing to diesel PM. Rail emissions data within SCAB is presented in Table 7.

Table 7
Estimated 2005 Annual Average Rail Emissions in SCAB

	Pollutant (Tons per Day)				
	NOx	SOx	PM10	PM2.5	CO
Rail	31.79	3.33	1.05	0.97	6.55
TOTAL All Sources	975.3	58.48	291.95	112.49	4100.19
Rail % of Total	3.3%	5.7%	0.4%	0.9%	0.2%

Source: South Coast AQMD 2003 Air Quality Management Plan

Emissions caused by vehicle delays at rail crossings contribute further to air quality issues relating to goods movement rail activity. The Leachman study established year 2000 baseline emissions generated from delayed vehicles at grade crossings as follows: 9.65 tons of ROG; 100.46 tons of CO; 13.85 tons of NOx; 0.54 tons PM10; and 0.09 tons of SOx.[27]

Truck corridors are also shared-use facilities in that cars use the same infrastructure. An increase in automobile traffic coupled with an increase in truck traffic causes even greater congestion. This negatively affects transportation efficiency for all users by creating congestion from overlapping user groups (total number of vehicles on the road) and especially inadequate capacity during peak hours, thereby increasing idling and related emissions. Truck emissions data within SCAB, including but not limited to port-related trucks, is presented in Table 9.

Table 9
Estimated 2005 Annual Average Truck Emissions in SCAB

	Pollutant (Tons per Day)				
	NOx	SOx	PM10	PM2.5	CO
Trucks	216.82	2.22	4.28	3.57	35.16
TOTAL All Sources	975.3	58.48	291.95	112.49	4100.19
Trucks % of Total	22.2%	3.8%	1.5%	3.2%	0.9%

Source: South Coast AQMD 2003 Air Quality Management Plan

Warehousing and distribution centers are experiencing increased bottlenecking and idling emissions due to increasing goods movement activities. Congestion at these facilities center upon the following key constraints: points of entry (gates), docks, and yard design and layout. Additionally, warehousing and distribution centers are the key destination point for trucks equipped with diesel-powered TRUs, which convey specific health risks (see Table 10).

Table 10
Estimated Cancer Risk versus Distance from Center of TRU Activity[28]

Distance from Center of Source	Potential Cancer Risk
275 meters (~900 feet)	> 100 per million
1,050 meters (~3,450 feet)	>= 10 and < 100 per million

Source: *Air Quality and Land Use Handbook: A Community Health Perspective.* Cal/EPA and California Air Resources Board. April 2005.

In addition, the trend to site warehousing and distribution centers further inland will result in longer truck trips, leading to an increase in local and regional congestion and emissions.[29]

Visual

A lack of appropriate height controls on new structures in pier development/redevelopment can cause visual incongruity and intrusion in the landscape of the adjacent community. Confined footprints of container storage yards at ports, rail yards, and warehousing and distribution centers can lead to increased container stack height, creating a negative visual aesthetic by blocking views or preventing natural lighting from reaching adjacent residential properties (shadowing). Further, encroachment into neighborhood areas can result from demand for additional storage space. As an example, residents of Wilmington are being encroached by a proliferation of "temporary" storage facilities near the port in locations not zoned for such use.[30] Lighting spillover can disrupt the sleep patterns of residents and may also negatively affect wildlife

by potentially causing disorientation or confusion of biological rhythms, and potentially cause high mortality in birds attracted to brightly lit buildings or towers.[31]

Noise & Vibration

Railway activity is a significant source of noise for people who live and work nearby. Noise relating to goods movement falls within two general categories: (1) noise generated on the rail line during goods transport, and (2) noise resulting from interfacing rail operations at goods movement facilities, such as vehicle idling, container placement and goods transfer, rail car coupling/uncoupling, and the operation of support equipment. A significant number of railway noise complaints result from idling engines and blowing whistles/horns as opposed to line haul operations, according to Illinois EPA noise advisor, Greg Zak.[32] At a distance of 50-feet, noise levels average 90 dBA for locomotive horn and 75 dBA for line haul operations traveling at 50 m.p.h.[33]The Federal Railroad Administration (FRA) estimates that 4.6 million people nationwide are severely impacted by locomotive horns.[34] Programs that extend freight operating hours through the night compounds the noise issue. During nighttime hours ambient noise levels are lower, thus causing related goods movement noise to be more noticeable by nearby sensitive populations.

Environmental Justice

On February 11, 1994, Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, was issued. The Executive Order directs federal agencies to take necessary and appropriate steps to identify and address disproportionately high and adverse human health or environmental effects of federal projects and programs on minority and low-income populations to the greatest extend practical and permitted by law. Fundamentally, environmental justice is about fairness toward the disadvantaged and often addresses the exclusion of racial and ethnic minorities from decision making. Some events that lead to EO 12898 and that established the principles of disproportionate impacts and exclusion in decision making as adopted by NEPA follow[35]:

- 1969 – The National Environmental Policy Act (NEPA) is passed in the U.S. Congress. This policy requires federal agencies to incorporate environmental values into the process of decision-making. Thinking about environmental impacts of proposed projects and considering reasonable alternatives is accomplished through Environmental Impact Statements (EIS).
- 1971 – The annul report on the U.S. Council on Environmental Quality (CEQ) acknowledges that racial discrimination adversely affects the environmental quality of urban people of color.
- 1983 – U.S. General Accounting Office (GAO) published Siting of Hazardous Landfills and Their Correlation with Racial and Economic Status of Surrounding Communities, and found that:
  - 75% of off-site commercial hazardous and toxic waste landfills were in communities of color although they made up only 20% of the population.
  - 60% of Latinos and Blacks live in areas with uncontrolled toxic waste sites.
- 1991 – In Kettleman City, CA, a judge rules in the El Pueblo para el Aire y Agua Limpio v County of Kings case that the permit process for a toxic waste incinerator is unsound. Moreover, the judge found that the local community was not “meaningfully involved” due to the failure to translate documents into Spanish.

As the goods movement system grows the first consideration is physical expansion – whether by increasing acreage at airports, seaports, and rail yards, enlarging warehouse footprints, or adding new asphalt lanes and steel tracks. The modal capacity expansion/land use connection often raises the issue of environmental justice. Environmental justice issues relating to goods movement arise most frequently when minority and low-income communities suffer disproportionately from transportation programs' negative impacts, like air pollution. Environmental justice issues can also arise when some communities are less represented than others when policy-making bodies debate and decide what should be done with transportation resources.

Water Quality & Wetlands

Storm water is the largest source of pollution of water quality impairment in U.S. coastal waters and the second-largest source of water pollution in U.S. estuaries.[36] Five to ten percent of dredged sediment nationwide is estimated to be contaminated with toxic chemicals, including polychlorinated biphenyls (PCBs), mercury and other heavy metals, polycyclic aromatic hydrocarbons, and pesticides.[37] Ship ballast water discharged in port areas introduces aquatic invasive alien species into U.S. waters, as well as pathogens, such as Clostridium perfringins, Salmonella species, Escherichia coli, Vibrio cholerae, and enteroviruses, which can result in paralytic shellfish poisoning, and can ultimately cause severe illness or death in humans.[38] Ballast water may also transfer micro-algae, including those species known to form harmful algae blooms or red tides.[39]

Diesel fuel from ship exhaust affects the quality of water and the vitality of marine life in and around port harbors. Pollutants can result in hypoxia (a condition where water has extremely low dissolved oxygen content typically insufficient to support marine life), or the eutrophication of coastal ecosystems (a reduction of dissolved oxygen in the water due to excess nutrients that stimulate excessive plant growth causing other organisms to die.)[40]

At ports, sediment deposits from filling coastal land to increase surface area for port operations can disrupt tidal influence necessary for vital coastal wetlands. Contaminated runoff from inland goods movement activities (rail yards, transportation corridors, and warehousing and distribution centers) has the potential to negatively affect inland wetlands. While typical goods movement expansion activities can displace existing wetlands, airports located near water sources have evolved into a sort of wetlands protector, as well. Due to airport land use compatibility issues, adjacent airport development is restricted. Therefore, adjoining wetlands experience limited displacement from off-airport development.

Hazmat

Potential releases of hazardous materials pose risks to the environment and communities near goods movement corridors and facilities. Releases could occur during these common activities: hazardous materials transport, fueling operations, and fuel storage. The potential for HAZMAT accidents during transit by rail and truck are increasing due to (1) the stand-alone increase in freight activity for rail operators, (2) the increase in potential safety conflicts between freight and commuter rail, and (3) the increase in potential safety conflicts at grade crossings with vehicular traffic. The warehousing and distribution center sector

segregates these specialized HAZMAT facilities from general commodities facilities (which handle typical consumer goods.)

Safety

Railroad crossing safety is a consideration as travel demand for rail (passenger and freight) and passenger vehicles increase. Blocked crossings by trains can be frustrating, time-consuming, and cause potentially dangerous situations, such as preventing the crossing of emergency vehicles, drivers attempting to "beat the train" to avoid long waits, or school bus drivers distracted with the noise and activity inside their bus. In spite of the potential risks associated with increased travel demand and goods movement activity, the FRA announced in March 2006 that train accidents and derailments declined in 2005, and that the highway-rail grade crossing collision rate is at an all-time record low. [41] Since 1995, the highway-rail grade crossing collision rate has declined from 6.92 to 3.84 per million train miles.[42] That being said, the FRA has recently announced a renewed focus on improving the safety at the nation's largely unregulated private highway-rail grade crossings where approximately 400 accidents, and between 30 and 40 fatalities, occur annually at the over 94,000 private crossings used by both freight and passenger trains.[43]

To accommodate ever-increasing passenger and freight rail demands, shared-track usage is occurring more frequently. Where shared use between freight rail and light rail transit (excluding other commuter rail) occurs, transit and insurance experts find little or nor additional risk to passengers compared to non-shared track transit operations.[44]

Increasing freeway congestion can motivate trucks to deviate and use surface streets within neighboring communities in search of alternate routes to enter ports, rail yards, and distribution centers and warehouses, which may create greater safety risks to both trucks and passenger vehicles.

E-4 Operational & Cumulative Resource Impacts

Future expansion of goods movement facilities and corridors, if proposed, has other potential significant resource effects, such as:

- Displacement of endangered or sensitive plant and animal species
- Disruption of wildlife corridors and habitat, alteration of drainage patterns, and conflict with established habitat/natural communities conservation plans
- Disturbance and displacement of irreplaceable cultural resources, such as historic buildings and archeological resources, including Native American lands
- Open space infringement and displacement

Each project that is subject to CEQA will warrant individual, site-specific analysis. For example, review of the California Natural Diversity Database (CNDDB) would occur for a preliminary determination on whether a proposed project has the potential to affect endangered, threatened, or sensitive plant and animal species. A CNDDB inquiry revealed potential special status species throughout the study area as shown in Figure 7.

A proposed project may also result in cumulative impacts that result from the incremental impact of the proposed project when added to other past, present, and reasonably foreseen future projects. Individually minor but collectively significant actions taking place over a period of time can occur, thereby resulting in significant environmental impacts.

Ultimately, there is no way of avoiding all impacts. By identifying them in advance under CEQA and NEPA, however, the potential for impact avoidance and minimization is greatly improved to the benefit of the environment and community.

E-5 Conclusion and Next Steps

This technical memorandum describes the types of environmental impacts within the MCGMAP study area and the regulatory framework governing the mitigation of these impacts. The regional environmental impacts identified by this technical memorandum will be the primary types of impacts that will be mitigated by strategies identified later in the MCGMAP project. Goods movement strategies developed under Task 6 of the MCGMAP will have environmental impacts within the region; some positive and some negative. By understanding the types and relationships of environmental impact within the study area, the MCGMAP will maximize both the economic opportunities associated with goods movement, as well as opportunities to reduce the associated environmental and community impacts.

The next task of the MCGMAP will focus on the development and evaluation of strategies to improve goods movement within the study area. Task 7 will follow and will identify good practices for mitigating the effect of goods movement on local communities and the environment. It is anticipated that Task 7 will result in the identification of set of strategies or good practices that can be implemented at a regional level to mitigate the environmental impacts of goods movement projects and reduce current acceptable levels of pollution. The purpose of Task 7 is to identify these mitigation measures for the region as a whole. Project specific mitigation measures or measures to mitigate regional environmental or community impacts will be identified and evaluated in future efforts.

Purpose of This Technical Memorandum

This Technical Memorandum 5b provides a general overview of the environmental issues that exist today concerning Southern California's good movement network. By providing a regional perspective of these issues, it will establish the baseline for upcoming study and analysis for the MCGMAP. These studies include the identification and evaluation of potential goods movement improvements (Task 6) and the identification of a list of good practice mitigation strategies (Task 7).

The purpose of Technical Memo 5b is to provide context to environmental issues related to goods movement within the regional setting. Copious data have already been collected and published due to concentrated efforts by numerous state and regional environmental agencies in a proactive effort to minimize goods movement environmental impacts and to protect the state's natural resources and citizens as we move into the future. The existing data verifies that increasing goods movement demand contributes to increasing levels of transportation congestion, emissions, and community impacts. Therefore, this memorandum will not assess in detail the environmental impacts associated with all goods movement activity. The intent of this memo is not to prove what has already been proven, but to provide the context necessary for the holistic evaluation of potential goods movement improvements and environmental mitigation strategies in the study area. The conclusive data is thus acknowledged and is hereby integrated into this section as a foundation.

As a result of increasing momentum for environmental awareness and protection within the goods movement industry, technological and policy developments are occurring at a very rapid pace. Weekly, if not daily, developments are published. A good faith effort has been made to include the major developments.

This memo begins in Section 1 with a review of the environmental framework in which the MCGMAP is operating – key regulatory framework and data. A discussion of prominent environmental and community impacts follows in Section 2. Section 3 discusses some of the potential operational and cumulative resource impacts from goods movement projects should they be proposed.

Regulatory Background

The study area covers a large geographic area that contains a wide variety of topography, air, water, and other environmental characteristics. Due to its unique geographic location, the state's environmental quality and control is shared between international, federal, state, and regional agencies. There are approximately 30 agencies with jurisdiction over a broad range of environmental impacts. Landmark environmental legislation includes the Clean Air Act, Clean Water Act, and Noise Control Act; however, it is the reduction of air pollutants via cleaner fuels, operational changes, and technological improvements that has received the primary focus. A comprehensive list of the agencies, jurisdictions, and responsibilities is included in Table 1 below.

Table 1

Key Environmental Regulatory Agencies

AGENCY	RESPONSIBILITY	JURISDICTION	KEY REGULATION(S)
International Civil Aviation Organization (ICAO)	International civil aviation standards established by Convention	International, but not preemptive of FAA	Annex 16: Environmental Protection, Volume II - Aircraft Engine Emissions
International Marine Organization (IMO)	International marine safety and pollution prevention law established by the United Nations	International	MARPOL Annex I-VI
US Congress	Established federal environmental protection and Council of Environmental Quality (CEQ) to further NEPA.	Nationwide	National Environmental Protection Act (NEPA)
US Environmental Protection Agency (EPA)	Regulation and enforcement for protection of human health and the environment.	Nationwide	Clean Air Act, Clean Water Act, Oil Pollution Prevention Regulation
Federal Aviation Administration (FAA)	Regulation and enforcement of aviation standards for airport, aircraft, and airmen.	Nationwide	Airport Noise & Compatibility Act; Commercial Airport Certification; Aircraft Certification
US Fish and Wildlife	Conservation and protection of fish, wildlife, and plants and their habitats.	Nationwide	Endangered Species Act
US Department of Transportation (DOT)	Ensuring a fast, safe, efficient, accessible, and convenient transportation system; oversees federal railroad, federal transit, and federal highway regulations.	Nationwide	Title 49 of the Code of Federal Regulations (Transportation), including Hazmat transport.
Bureau of Land Management (BLM)	Sustain the health, diversity, and productivity of the public lands.	Nationwide	Federal Land Policy and Management Act
Army Corps of Engineers (ACE)	Water resource and environmental restoration and stewardship.	Nationwide	Permitting of projects/actions affecting navigable waters of the US
California Legislature	Established state environmental protection and the State Clearinghouse and Office of Planning and Research (OPR) to further CEQA.	Statewide	California Environmental Quality Act (CEQA)
Business, Transportation, & Housing Agency	Oversees 13 state agencies, including Caltrans, California Highway Patrol, Department of Motor Vehicles, and Department of Alcoholic Beverage Control; Regulates managed health care	Statewide	Oversight of law enforcement activities of subordinate state agencies.

AGENCY	RESPONSIBILITY	JURISDICTION	KEY REGULATION(S)
	plans as well as the banking, and financial and securities industries		
California Fish & Game	Manage fish, wildlife, and plant resources and their habitats	Statewide	California Endangered Species Act
California EPA *see also CARB and SWRCB*	Oversees CARB, SWRCB, Department of Pesticide Regulation, Department of Toxic Substances Control, Office of Environmental Health Hazard Assessment, Integrated Waste Management Board	Statewide	California Clean Air Act
California Air Resources Board (CARB) *see also Regional Air Quality Management Districts*	Part of CalEPA; to promote and protect public health, welfare, and ecological resources through effective reduction of air pollutants while recognizing and considering effects on the economy.	Statewide	California Air Pollution Control Laws
State Water Resources Control Board (SWRCB) *see also Regional Water Quality Control Boards*	Water allocation and water quality protection; Oversees nine regional boards	Statewide	Porter-Cologne Water Quality Control Act (California Water Code, Division 7)
Native American Heritage Commission	Identify and catalogue Native American cultural resources, and prevent damage to and insure Native American access to sacred sites. Also, identify a Most Likely Descendant (MLD) when Native American human remains were discovered any place other than a dedicated cemetery -- MLDs were granted the legal authority to make recommendations regarding the treatment and disposition of the discovered remains.	Statewide	
Regional Air Quality Management Districts	*See CARB*	Regional	
South Coast AQMD		Portions of Los Angeles, Orange, Riverside, and San Bernardino counties	Emissions regulations

AGENCY	RESPONSIBILITY	JURISDICTION	KEY REGULATION(S)
South Central AQMD		Ventura County	Emissions regulations
Imperial County Air Pollution Control District		Imperial County	Emissions regulations
San Diego Air Pollution Control District		San Diego County	Emissions regulations
Mojave Desert AQMD		Portions of Los Angeles, Riverside, and San Bernardino counties	Emissions regulations
Antelope Valley AQMD		Portion of Los Angeles County	Emissions regulations
Regional Water Quality Control Boards	*See SWQCB*	Regional	
Los Angeles RWQCB		Portions of Los Angeles and Ventura counties	Water allocation and water quality protection regulations
Santa Ana RWQCB		Portions of Orange, San Bernardino, and Riverside Counties	Water allocation and water quality protection regulations
Colorado River Basin RWQCB		Portions of San Bernardino, Riverside, and San Diego Counties	Water allocation and water quality protection regulations
Lahontan RWQCB		Portions of Los Angeles and San Bernardino Counties	Water allocation and water quality protection regulations
San Diego RWQCB		Portions of Orange and Riverside Counties	Water allocation and water quality protection regulations
Central Coast RWQCB		Portion of Ventura County	Water allocation and water quality protection regulations

Source: Jones & Stokes, 2006; Wilbur Smith Associates, 2007.

1.1 California Air Quality Regulation

As previously mentioned, the focus of environmental regulations is the reduction of air pollutants, primarily due to their potential impacts on human health. Air pollution control in California is a shared responsibility between 35 local air quality management districts (AQMD), the California Air Resources Board (CARB),

and the United States Environmental Protection Agency (EPA). Some of the basic responsibilities of each entity are outlined as follows:

AQMD – adopt local air quality plans and rules; control and permit industrial pollution sources (e.g., power plants, refineries, and manufacturing operations) and area-wide sources (e.g., bakeries, dry cleaners, and service stations); control indirect pollution sources (i.e., facilities that attract mobile sources.)

CARB – establish state ambient air quality standards; adopt and enforce emission standards for mobile sources (except where federal law preempts CARB's authority), fuels, and toxic air contaminants; oversee AQMD compliance with federal and state law; approve local air quality plans and submit State Implementation Plans (SIPs) to the EPA.

EPA – Establish national ambient air quality standards; set emission standards for mobile sources; oversee state air programs as they relate to the Federal Clean Air Act; approve SIPs.

1.2 Pollution & Air Basins

Sources of air pollution are divided into four major emissions categories: stationary, area-wide, mobile, and natural. The MCGMAP focuses on the mobile source emissions from trucks, ships, rail, and aircraft.

CARB designates air basins for assessing pollutants from emissions based on varying topographic, air, water, and other environmental characteristics. Meteorological and geographic/topographic conditions within an air basin are generally similar throughout, as these conditions factor into how pollution behaves when released into the atmosphere.

CARB establishes state ambient air quality standards (SAAQS) for criteria pollutants, such as nitrogen oxides (NO_2), ozone, particulate matter of 10-microns and 2.5-microns or less (PM10 and PM2.5, respectively), carbon monoxide, and sulfur oxides (SO_2). In addition, California is subject to national ambient air quality standards (NAAQS) set by the Environmental Protection Agency (EPA); however, state standards are typically more stringent and are defaulted to in the context of environmental analyses for studies such as the MCGMAP. Federal law establishes specific deadlines to attain national ambient air quality standards; however, no such deadlines are established by the State.

Specifically, CARB establishes state area designations for the following 10 criteria pollutants: ozone, suspended particulate matter (PM10), fine suspended particulate matter (PM2.5), carbon monoxide, nitrogen dioxide, sulfur dioxide, sulfates, lead, hydrogen sulfide, and visibility reducing particles. In contrast to the state area designations, the U.S. Environmental Protection Agency (U.S. EPA) makes national area designations for five criteria pollutants: ozone (1-hour and 8-hour standards), PM10, carbon monoxide, nitrogen dioxide, and sulfur dioxide.

CARB monitors the air quality in each basin and assigns area designations by criteria pollutant. Area designations are:

Attainment: a pollutant is designated attainment if the state standard for that pollutant was not violated at any site in the area during a three-year period.

Nonattainment: a pollutant is designated nonattainment if there was at least one violation of a state standard for that pollutant in the area.

Nonattainment/Transitional: is a subcategory of the nonattainment designation. An area is designated nonattainment / transitional to signify that the area is close to attaining the standard for that pollutant.

Unclassified: a pollutant is designated unclassified if the data are incomplete and do not support a designation of attainment or nonattainment.

Air Quality Management Districts (AQMD) are the regional government agency responsible for air pollution control in their management districts. AQMD regulations and plans must be approved by CARB and the U.S. EPA.

The five counties within the MCGMAP study area encompass four of the states' 15 air basins and four of 35 AQMDs as follows in Table 2:

Table 2
Southern California Air Districts and Air Basins

COUNTY	AIR BASIN	AIR DISTRICT
Imperial	Salton Sea Air Basin	Imperial County Air Pollution Control District
Los Angeles	South Coast	South Coast AQMD
	Mojave Desert	Mojave Desert AQMD and Antelope Valley AQMD
Orange	South Coast	South Coast AQMD
Riverside	South Coast	South Coast AQMD
	Mojave Desert	Mojave Desert AQMD
	Salton Sea	Mojave Desert AQMD
San Bernardino	South Coast	South Coast AQMD
	Mojave Desert	Mojave Desert AQMD
San Diego	San Diego Air Basin	San Diego Air Pollution Control District
Ventura	South Central Coast	Ventura County AQMD

Source: Jones & Stokes, 2006.

The relation between the study area's counties, air quality management districts, and air basins are displayed in Figure 1 below.

An ambient air quality standard is the definition of "clean air." A standard establishes the concentrations above which a pollutant is know to cause adverse health effects to sensitive groups within the population, such as children and the elderly. Area designations for state ambient air quality standards for each air basin covering the MCGMAP counties are summarized in Table 3. Figures demonstrating the area designations for criteria pollutants (excluding CO due to attainment status) within the study area are located in Appendix A.

California's largest metropolitan region – and largest goods movement contributor in the state – is the South Coast Air Basin (SCAB). The SCAB encompasses the southern two-thirds of Los Angeles County, all of Orange County, and the western urbanized portions of Riverside and San Bernardino counties. The area is comprised of 6,480 square miles, 43 percent of California's population, and contributes 29 percent of the state's total criteria pollutant emissions.[1]

Figure 1
Air Districts and Air Basins

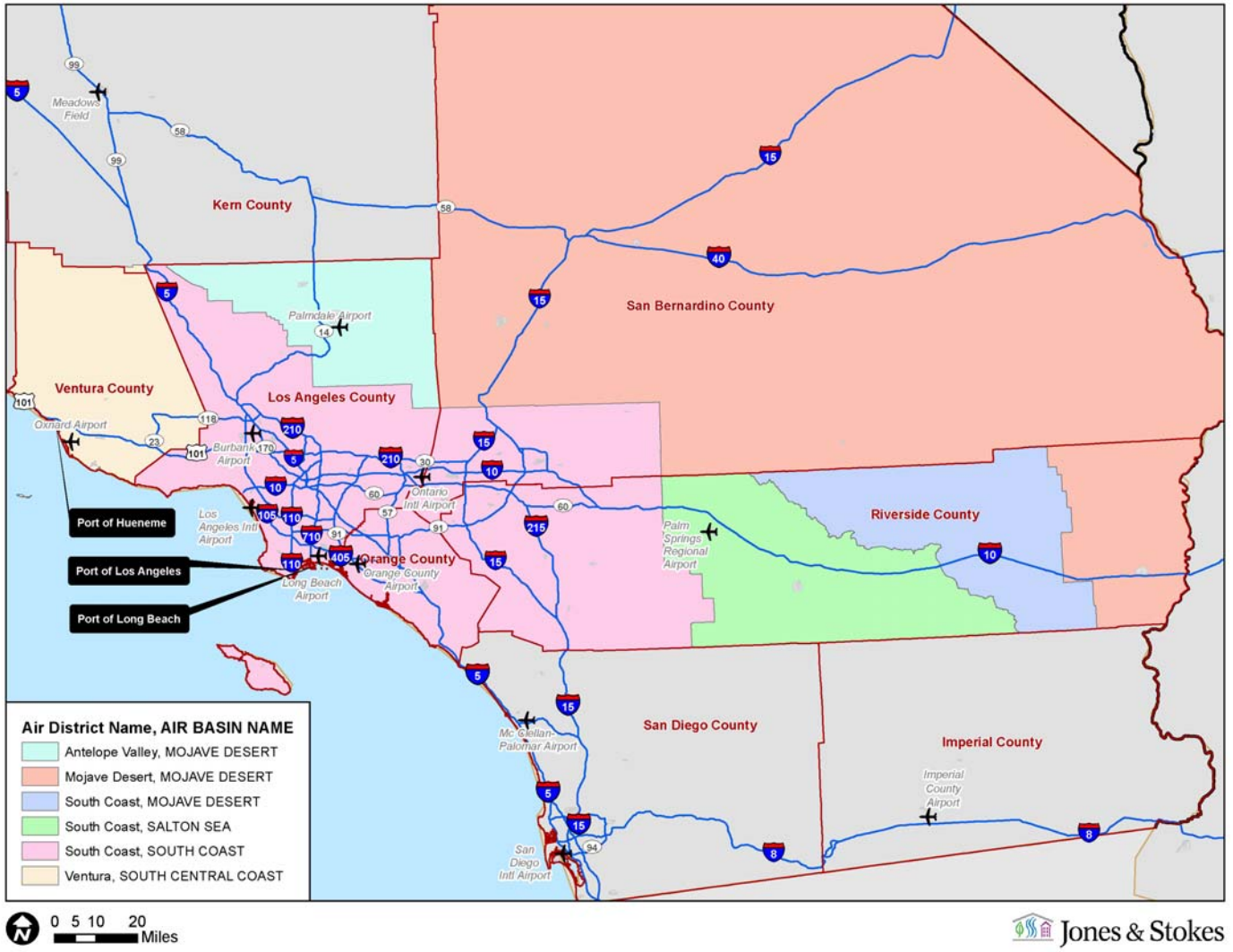


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Table 3
State Area Designations per Criteria Pollutants

BASIN	POLLUTANT [a, b]					
	Ozone	PM10	PM2.5	NO_2	SO_2	CO
South Coast	Nonattainment	Nonattainment	Nonattainment, except for Unclassified in northern L.A. County	Attainment	Attainment	Attainment
Mojave Desert	Nonattainment	Nonattainment	Nonattainment, except Unclassified in eastern San Bernardino and eastern Riverside Counties	Attainment	Attainment	Attainment, except for Unclassified in eastern Riverside County
South Central Coast	Nonattainment	Nonattainment	Nonattainment	Attainment	Attainment	Attainment
Salton Sea	Nonattainment	Nonattainment	Unclassified	Attainment	Attainment	Attainment

Notes:

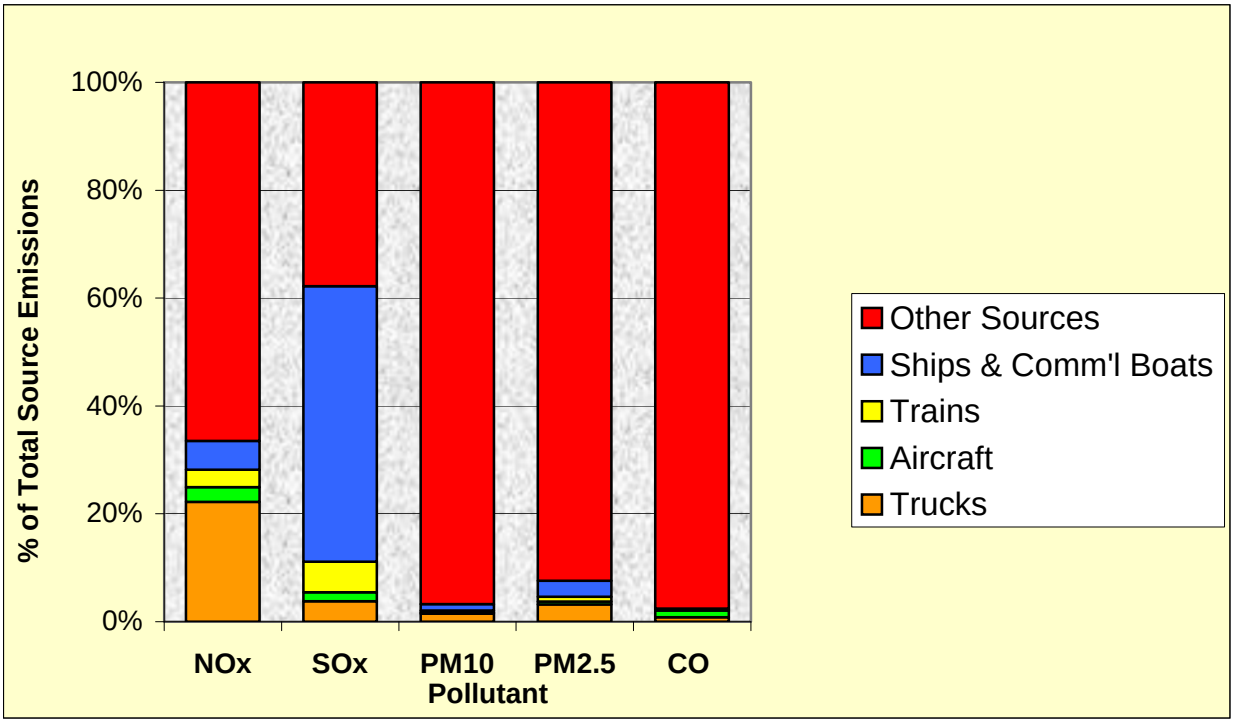
[a] Area Designation for State Ambient Air Quality Standards Ozone, PM10 and CO. California Air Resources Board. Updated October 18, 2004. http://www.arb.ca.gov/knowzone/basin/basin.htm.

[b] 2004 Area Designations for State Ambient Air Quality Standards PM2.5, Nitrogen Dioxide, and Sulfur Dioxide maps. CARB. October 18, 2004. http://www.arb.ca.gov/desig/adm/adm.htm.

Source: Jones & Stokes, 2006.

The SCAB generally forms a lowland plain, bounded by the Pacific Ocean on the west and by mountains on the other three sides. According to the CARB, there are probably few areas less suited for urban development in terms of air pollution potential. The warm, sunny weather associated with a persistent high-pressure system is conducive to the formation of ozone, commonly referred to as "smog." The surrounding mountains, frequent low inversion heights, and stagnant air conditions further aggravate the problem. All these factors act together to trap pollutants in the air basin. Pollutant concentrations in parts of this air basin are among the highest in the Nation.2 Emissions from goods movement in relation to all emission sources in the SCAB are presented below in Figure 2.

Figure 2
2005 Estimated Annual Average Emissions in South Coast Air Basin



Source: *Final 2003 Air Quality Management Plan.* South Coast Air Quality Management District.

As indicated in Figure 2 above, the goods movement industry is a major contributor to SCAB emissions, especially for NOx and SOx. Other emissions sources contributing to the Basin's air quality as reported by the AQMD include:

- On-Road Mobile – automobiles and lighter duty trucks. Excludes heavy heavy duty (HHD) trucks accounted for in goods movement truck category.
- Other Mobile – off road sources, such as recreational boats, off-road recreational vehicles, and farm equipment. Excludes goods movement categories of aircraft, trains, and ships.
- Stationary and Area – numerous sources, such as utilities, oil and gas production, waste disposal, cleaning and surface coating, industrial processes (e.g. food and agriculture, electronics, and wood and paper), and solvent evaporation.

The percentage contribution of these emissions sources in comparison to the goods movement industry is presented in Table 4.

Table 4
2005 Estimated Annual Average Emissions in South Coast Air Basin
(Percent of Total)

Source	Pollutant				
	NOx	SOx	PM10	PM2.5	CO
Goods Movement	33.5%	62.2%	3.3%	7.6%	2.4%
On-Road Mobile	37.3%	4.3%	5.1%	8.4%	65.1%
Other Mobile	19.1%	0.9%	5.3%	12.0%	27.4%
Stationary & Area	10.0%	32.6%	86.3%	72.1%	5.1%

Source: *Final 2003 Air Quality Management Plan.* South Coast Air Quality Management District.

Air quality standards and regulations are dynamic in nature, undergoing changes as new data concerning pollutant impacts emerge and as goods movement transportation policy evolves. Some recent emerging issues and developments concerning the study area's air quality relating to the goods movement network are briefly discussed below.

- The EPA promulgated first-time area designations for PM 2.5 in early 2005. High PM2.5 concentrations result from reactions in the atmosphere from precursor gases emitted from combustion sources, and from direct particulate emissions from mobile sources and burning activities. The SCAB is designated as nonattainment for PM2.5 (currently, the other basins within the MCGMAP are in attainment). SIPs for PM2.5 nonattainment areas are scheduled for submittal in early 2008. Actions currently taken to reduce ozone, PM10, and diesel PM will also help to reduce PM2.5.

- The United States-Thailand Free Trade Agreement (FTA) has been proposed by the Office of the United States Trade Representative (USTR).[3] In October 2003, President Bush announced his intent to enter into FTA negotiations with Thailand, reaffirming his commitment under the Enterprise for ASEAN Initiative (EAI) to strengthen trade ties with countries in the ASEAN region that are actively pursuing economic reforms. An agreement with Thailand, which is currently the United States' 20th largest trading partner, would significantly increase trade in goods and services, thereby creating a potential significant impact on the goods movement system in Southern California. Following several rounds of negotiation in 2004 and 2005, the Interim Environmental Review (IER) (per section 2102(c)(4) of the Trade Act of 2002) examining possible environmental effects associated with the FTA was published in the Federal Register for comment. In January 2006, a Southern California response was issued emphasizing, "…There is a clear federal responsibility to help our region address the local domestic impacts of global trade."[4] Whereas the IER concluded that the FTA is not expected to have a negative impact on U.S. (i.e., *national*) enforcement and maintenance of environmental laws and regulations, the Southern California response is anticipated to influence appropriate *localized* environmental considerations to the final trade agreement.

- The U.S. EPA has recently amended emission standards for nitrogen oxides (NOx) for new commercial aircraft engines. The new standards (adopted in 1999 and effective in 2004) are equivalent to the NOx emission standards of the United Nations International Civil Aviation Organization (ICAO), and will

bring U.S. aircraft into alignment with international standards. These standards will apply to new aircraft engines used on commercial aircraft. A 16% NOx reduction is expected between the old and new standards.[5]

- Effective January 1, 2007, domestic and international ships operating auxiliary diesel engines (Category 2 engines) and diesel-electric engines (Category 3) will be required to use cleaner burning diesel when approaching within 24 nautical miles[6] of the California coast. This new CARB regulation also allows for alternative compliance with fuel requirements if the vessel operator utilizes programs such as: shore-side electric power for each California port call; auxiliary engine modifications; exhaust treatment control; use of alternative fuels or fuel additives.

Regulating emissions from international vessels is a continuing challenge. International aircraft and marine vessel standards are not expected to result in any reduction in emissions, due to the weakness of such standards and due to growth in trade volume. Seaports are international by nature. The primary convention regulating and preventing marine pollution by ships is the International Maritime Organization (IMO) International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78). It covers accidental and operational oil pollution as well as pollution by chemicals, goods in packaged form, sewage, garbage, and air pollution. MARPOL Annex VI (adopted in 1997 and effective in 2005) amended the convention by regulating limits on sulphur oxide and nitrogen oxide emissions from ship exhausts and prohibits deliberate emissions of ozone depleting substances.

1.3 Goods Movement-Related Agency Plans

While numerous regulatory agencies establish environmental standards, travel demand resulting from rapid population and goods movement growth are challenging the study area's ability to mitigate the related impacts on its natural resources and community neighborhoods. For example, the study area is in attainment with the required levels of carbon monoxide (CO), nitrogen oxides (NOx), and sulfur oxides (SOx).[7] However, the study area is in non-attainment with air quality standards for ozone and particulate matter. More efforts are required to bring the study area into attainment for all air quality standards to the benefit of the environment and those living here.

However, it is important to note that there has been significant progress in mitigating and reducing environmental and community impacts. Without the progress to date, the study area would be in far worse condition.

Significant progress in the reduction of air emissions and its impacts to the community has been made and can be credited to implemented environmental policies. For example, CARB estimates that due to air quality regulations adopted through October 2005 the following emission levels in diesel PM, NOx, and SOx from years 2001 to 2020 will result in:[8]

- Substantial diesel PM emissions reductions from trucks (84%), harbor craft (53%), and cargo handling equipment (75%); a minor rail reduction (4%); and a substantial increase from ships (199%).

- Substantial NOx emissions reductions from trucks (61%), harbor craft (48%), cargo handling equipment (71%), and rail (32%); and a substantial increase from ships (168%).
- Substantial SOx emissions reductions from trucks (80%), harbor craft (75%), and rail (99%); no change in cargo handling equipment emissions; and a substantial increase from ships (200%).

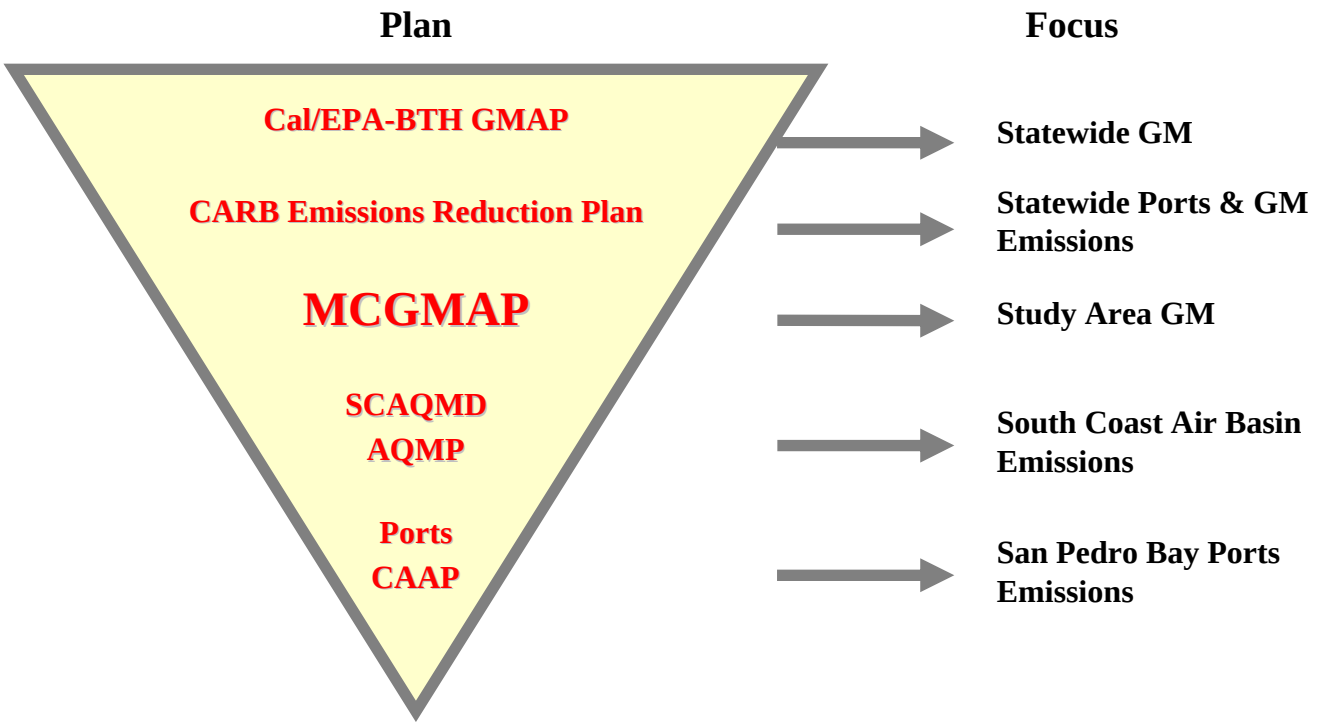
While the reductions to the domestic mobile source emissions are expected to be significant, this is not a guarantee that the study area will meet emissions budgets or attain federal and state standards for PM2.5 or ozone. This issue will be further addressed in Technical Memo 7.

It should also be noted that the gains in known health impacts associated with a reduction in domestic goods movement air emissions are less substantial due to anticipated increases in air pollutant emissions from international ships.

Ongoing efforts – both by regulatory agencies and private industry – will help to minimize the impacts as the region continues to reap the effects of increased growth. For example, such efforts in regards to reducing pollutant emissions include: dockside cold ironing, cleaner fuel requirements, extended hours for port operations, voluntary vessel speed reductions, truck idling limits, use of diesel-hybrid switch locomotives, and rail grade separations.

Promisingly, California agencies continue to aggressively address goods movement emissions. Four landmark plans are currently shaping the goods movement industry within the study area as follows: (1) California EPA (Cal/EPA) and the Business, Transportation, and Housing Agency (BTH) *Goods Movement Action Plan Phase II Progress Report: Draft Framework for Action* (March 2006), (2) CARB *Emission Reduction Plan for Ports and Goods Movement in California* (March 2006), (3) SCAQMD *2003 Air Quality Management Plan*, and (4) the Ports of Long Beach and Los Angeles *San Pedro Bay Ports Clean Air Action Plan* (Draft – June 2006). This Multi-County Goods Movement Action Plan (MCGMAP) will supplement these agency plans. The sphere of influence of each plan is presented in Figure 3 below. An overview of each plan (excluding the MCGMAP) follows.

Figure 3
Agency Plans Sphere of Influence



Source: Jones & Stokes, 2006.

The Cal/EPA-BTH Goods Movement Action Plan is a statewide goods movement action plan proposed by the Schwarzenegger Administration to generate jobs, increase mobility and relieve traffic congestion, improve air quality and protect public health, enhance public and port safety, and improve California's quality of life. The plan addresses goods movement infrastructure and operations, as well as air quality emission reductions efforts. The state's action plan, based upon CARB's Emissions Reduction Plan, establishes the following goals:

- Reduce emissions to year 2001 levels by 2010.
- Continue reducing emissions past year 2001 levels until attainment of applicable standards is achieved.
- Reduce diesel-related health risks by 85% by year 2020.
- Ensure sufficient localized air toxics risk reductions in each affected community.

Funding of the state's estimated fifteen billion dollar ($15B) action plan is proposed to include: $1.95B in previously committed public funding; a proposed bond (S.B. 1266 – *Highway Safety, Traffic Reduction, Air Quality, & Port Security Bond Act of 2006*) encompassing $2B for trade corridor improvement projects with 1:1 matching, plus $1B for air quality improvements (no matching requirement); and suggested funding strategies (regulations, incentives, federal funding, user-based fees, and market-based approaches.) A key component of the plan is the simultaneous and continuous improvement in infrastructure and mitigation.

That is, environmental mitigation is to be included as a cost of a goods movement infrastructure project and funded as a single project. A preliminary working list of candidate projects has been developed based on criteria. Examples of goods movement infrastructure projects include dock-rail facilities, the Alameda Corridor East, and rail capacity improvements.

The CARB Emissions Reduction Plan focuses on statewide emission reductions specifically from ports and the goods movement industry. Whereas the Cal/EPA-BTH action plan addresses both infrastructure projects and air quality projects, CARB's plan focuses solely on air quality per their legislative purview. While the plans are consistent with one another, the Emissions Reduction plan is broader in terms of air quality efforts. Overall goals of the plan include:

- Reduce total statewide international and domestic goods movement emissions back to year 2001 levels or below by year 2010.
- Reduce statewide diesel particulate matter health risk from goods movement by 85% by year 2020.
- Reduce NOx emissions from international goods movement in the South Coast by 30% from projected year 2015 levels, and 50% from projected year 2020 levels (based on preliminary targets for attaining federal air quality standards).
- Apply plan strategies statewide to aid all regions in attaining air quality standards.

To meet these goals, the plan's regulatory strategies include several measures, including:

- More stringent emissions standards
- Cleaner fuels
- Shore power
- Speed reduction of ships
- Engine upgrades and retrofits
- Emission control devices

Implementation of the Emissions Reduction Plan is estimated to cost $6 to $10B over 15 years. CARB estimates that the economic benefits in terms of the savings via the avoidance of adverse health impacts over the same time period are $34 to $47B. Funding of the plan assumes all industries involved must share in investment costs, and is generally unfunded by CARB itself. The agency, however, does acknowledge that incentives are critical to some sectors, and has also proposed the creation of a special $5M annual fund for goods movement demonstration projects. In addition to incentives, possible funding strategies include the state's proposed bond (S.B. 1266), container fees, federal funding, other user fees, and market-based approaches.

The SCAQMD *2003 Air Quality Management Plan (AQMP)* is a mandated document that develops emissions budgets for SIP conformity with state and national ambient air quality standards. The SIP is ultimately approved by the U.S. EPA to satisfy requirements of the federal Clean Air Act following approval by CARB. One of the Air Resources Board's responsibilities is to propose the State and federal strategy for the SIP to reach the federal standards. The SIP is a comprehensive strategy designed to attain federal air quality standards as quickly as possible through a combination of technologically feasible and cost-effective measures. It outlines ARB staff's assessment of how far adopted regulations will take us towards

attainment of federal standards, what new actions could be taken, how the timing of new technology and incentive funds comes into play, and what are the earliest feasible timeframes for meeting standards is likely to be in each region.[9] Goods movement-related [mobile source] emissions projections are integral to the AQMP. SCAQMD's air pollution control strategy focuses on controlling man-made sources through technologies and management practices, and relies on mobile source control measures developed by CARB.

SCAQMD acknowledges the importance of a multi-agency approach in addressing long-term air quality improvements:

To ultimately achieve ambient air quality standards and demonstrate attainment, additional long-term emissions reductions will be necessary from sources including those primary under the jurisdiction of California Air Resource Board (e.g., on-road motor vehicles, off-road equipment, and consumer products) and U.S. Environmental Protection Agency (e.g., aircraft, ships, trains, and pre-empted off-road equipment.) Without adequate and fair share level of reductions from all sources, the emissions reduction burden would unfairly be shifted to sources that have otherwise done their part for clean air.[10]

Clean air progress is a challenging task that must account for complex interactions between emissions and resulting air quality, but also to pursue the most effective possible set of air quality improvement strategies while maintaining a healthy economy.[11] To ensure continued progress toward clean air and compliance with state and federal requirements, the AMQP is developed by SCAQMD in conjunction with CARB, SCAG, and the U.S. EPA. Every three years, AQMD revises the AQMP for air quality improvement. Each iteration of the plan is an update of the previous plan and has a 20-year horizon. The current 2003 AQMP focuses on demonstrating attainment with the federal PM10 ambient air quality standard by 2006 and with the federal 1-hour ozone standard in year 2010 while making notable progress toward attainment of state standards and upcoming new federal standards. The development of the 2007 Plan is currently in progress and will focus in part on new federal 8-hour ozone and PM2.5 standards.

The *San Pedro Bay Ports Clean Air Action Plan* (CAAP) is the most recently developed plan to target goods movement emissions at the Port of Los Angeles (POLA) and Port of Long Beach (POLB). Jointly developed with the SCAQMD, the Ports released the draft plan in June 2006, which is expected to be approved by the Ports' governing boards in September of the same year. The CAAP is a "living document" in that is to be reviewed for progress and updated annually.

The CAAP established attainment standards on three levels: San Pedro Bay standards, project specific standards, and source specific performance standards. Trucks, ships (ocean going vessels), rail, harbor craft, and cargo handling equipment are targeted for various control measure and initiatives, including:

- Improvements to engine performance standards, alternate fuels and power, and emissions reductions.
- Technology Advancement Program
- Infrastructure and operational efficiency improvements
- Tracking and monitoring

Several implementation strategies are outlined in the CAAP:

- Lease requirements
- Tariff charges
- CEQA mitigations
- Incentives
- Voluntary measures
- Credit trading
- Capital lease backs
- Government-backed loan guarantees for trucks

The CAAP targets the annual reduction of specific pollutants. For example, the Plan anticipates a reduction in NOx by 13,090 tons per year (TPY), diesel particulate matter by 1,242 TPY, and SOx by 2,721 TPY. To accomplish these goals, the CAAP encompasses a 5-year program at an estimated cost of $1.98B.[12] Initially committed funding to be provided by the Ports and SCAQMD totals $394.4M, resulting in a potential shortfall of approximately $1.6B. This shortfall is likely to be addressed in part by the state's proposed bond measure (S.B. 1266) if voters pass the measure in late 2006.

It is to the benefit of the community that there are a number of agencies working ceaselessly towards reducing the impacts of goods movement and thereby improving the overall condition of the environment. Impacts on the environmental and community that result from the goods movement industry include traffic congestion, air quality and health, visual, noise and vibration, water quality, wetlands, hazardous materials (HAZMAT) movement, and safety, amongst others. Quality of life and environmental justice issues are also concerns of communities affected by goods movement activities.

This section provides a summary of the environmental and community impacts associated with goods movement found throughout the MCGMAP region. These impacts were identified by the project team based on experience preparing project-level environmental assessments within the MCGMAP region. It should be noted that during the outreach process (conducted as a part of Task 2), stakeholders within the MCGMAP region voiced strong concern over the impacts of goods movement on the environment, their communities, and their overall quality of life. Due to the serious environmental, public health impacts and traffic congestion issues, communities and policy makers have begun to demand mitigation and to challenge proposals for infrastructure capacity enhancement. The stakeholders within the affected communities are opposing key infrastructure improvement projects that could improve current circumstances, they are calling for slower growth and mitigation of existing impacts.

The stakeholder outreach process has highlighted the critical need to address community and stakeholder concerns regarding the environmental and community impacts of goods movement while pursuing infrastructure improvements. The mitigation of direct and indirect impacts of specific goods movement projects or related activities must become a part of the process from the early stages.

Examples of general existing environmental and community issues identified by County are shown below. Note that these are general issues and are not listed in order of importance. In many cases, goods movement may be one of many contributing factors for each specified impact. For the purposes of Task 5 of the MCGMAP, only a listing of environmental impacts and concerns related to goods movement are identified; therefore, the resulting list is very general.

1. Orange County
    a. Air quality
    b. Noise
    c. Grade crossing delays / congestion
2. San Bernardino County
    a. Land use impacts / conflicts
    b. Noise
    c. Operational issues
    d. Grade crossing delays / congestion
3. Riverside County
    a. Land use impacts / conflicts
    b. Noise
    c. Operational issues
    d. Grade crossing delays / congestion
4. Los Angeles County
    a. Port / Gateway Cities issues

   i. Air Quality
   ii. Health
   iii. Noise
   iv. Lighting
   v. Environmental Justice
   vi. Water quality
   b. Truck volume and congestion
   c. Commercial vehicles on local streets,
   d. Noise
   e. Land use impacts / conflicts
   f. Air quality
5. Ventura County
   a. Land use compatibility / conflicts
6. San Diego County
   a. Air quality
      i. Trucks coming in and out of Mexico
   b. Land use impacts / conflicts
7. Imperial County
   a. Air quality
      i. Mexican truck emissions
   b. Land use impacts / conflicts

2.1 Quality of Life

The general quality of life for area residents is greatly affected by the goods movement network. While quality of life is not an environmental impact per se, it is important because so many individual environmental impacts influence the ability to enjoy one's living conditions. Quality of life is primarily affected by the following environmental impacts: traffic congestion, land use compatibility and land use changes, air quality and related health impacts, visual and noise impacts, and safety. These impacts affect people in their residences, schools, and public spaces.

2.2 Traffic Congestion

As trade activity increases, so must the goods movement network, including the transportation modes that use pollution-producing fuel – aircraft, ships, trucks, rail, and the necessary support vehicles and equipment. In addition to meeting the trade needs, there is the added challenge to operate within an ever-constrained transportation network. Surface goods movement corridors are shared with non-goods movement users – cars using existing roadways and commuters using the rail network. Such shared use of corridors negatively affects transportation efficiency for all by creating congestion from overlapping user groups and inadequate capacity during peak hours, thereby increasing idling and related emissions. The competition for network capacity can also cause conflict as modes intersect more frequently. For example, safety issues can arise between heavy trucks and passenger vehicles or between passenger vehicles and

trains at railroad crossings. Increased trade also leads to increased bottlenecking at and within the ports as operational space is constrained.

Ninety-nine percent of the trips taken within the MCGMAP study area occur upon the highway and arterial network. This network is comprised of over 9,000 freeway lane miles and more than 42,000 arterial lane miles. This accounts for over 54 million vehicle trips per day on a network that has seen little added capacity in comparison to population growth. Both passenger vehicles and trucks compete for space on the roadway network. Truck vehicle miles traveled (VMT) is estimated to approach 39.1 million in year 2030, a 63% increase from 2000.[1] Automobile traffic in 2030 is expected to approach 449.7 million VMT, an increase of 33%, and will account for 92% of the total VMT. The total daily delay from congestion in 2000 was estimated at 2.2 million person-hours, and could reach 5.4 million person-hours by 2030.[2]

Rational driver behavior predicts that drivers faced with increasing corridor congestion will divert from their original route in an attempt to find a more efficient path to their destination. Once an alternate path is established, it becomes a regular pattern. One effect of this behavior is increasing diversion of truck traffic from highways to city surface roadways that run adjacent to or through communities. The affects on neighborhoods are felt via increased truck traffic noise, increased surface street congestion, increased concerns for pedestrian and bicycle safety, and visual landscape incongruity. As surface street congestion increases, so do idling and emission levels.

However, it has been asserted a 10 percent gain in lane capacity could be achieved by shifting 30 trucks per hour from the freeway to railway.[3] The benefit could be felt by commuters in travel time savings on freeways and by neighborhoods in potentially less truck traffic diversion from freeway corridors.

2.3 Land Use & Compatibility Changes

Community impacts resulting from goods movement – whether physical health or other facets of environmental quality – basically stem from land use policy relating to modal operations and capacity expansion.

Negative impacts on communities from goods movement are greatly affected by land use policy. Residential areas are often in close proximity to truck and rail corridors as well as highly industrialized ports and high-activity warehousing and distribution centers. Property prices adjacent to ports and goods movement corridors are generally discounted due to their location. This has pushed development from both ends of the equation – (a) goods movement facilities have expanded thus encroaching into residential neighborhoods, and (b) residential development due to population growth (and a need for affordable housing) has expanded thus encroaching onto goods movement facilities. Buffer zones are being squeezed out of existence thereby resulting in land use incompatibilities.

High land costs in the developed areas surrounding ports, airports, intermodal terminals, and truck terminals have forced the freight transportation industry to look to outlying areas for facility growth. This coupled with the region's spreading development patterns has caused regional freight distribution patterns that emphasize peak period congestion and high levels of freight vehicle-miles traveled.[4]

Distribution and warehousing centers typically utilize cheap suburban land to relocate and expand their facilities. Housing developers are building in the same areas to provide homes to the region's growing population. Over time, the pattern experienced in today's developed sections of the metropolitan area may likely be repeated. Community pressure may mount for the distribution centers to relocate and expand further out of the region. One long-term outcome may be more dispersed distribution centers and longer truck trips, leading to an increase in local and regional congestion and emissions.[5] The use of brownfields located near ports in some areas of the country is receiving more consideration as the goods movement sector continues to grow, providing the warehousing and distribution center industry more opportunities for affordable and developable land, easy access to markets, transportation modes, and labor supply.[6]

As the goods movement network looks to meet demands of ever-increasing growth, the first consideration is physical expansion – whether by increasing airport, seaport and rail yard acreage, enlarging warehouse footprints, or adding new asphalt lanes and steel tracks. Historically, it has been common practice to displace nearby residents and businesses in order to acquire property for infrastructure expansion in meeting capacity needs.

This overlapping, and oft incompatible, land use between goods movement and the general population results in a multitude of community impacts that are discussed in this technical memorandum – that is, the increases in traffic congestion, emissions and air quality, visual and noise impacts, and overall quality of life largely result from land use decisions. The degree to which communities are exposed to goods movement impacts are influenced by the appropriateness of land use decisions.

2.4 Air Quality & Health Impacts

As previously mentioned in Section 1, the primary focus of environmental regulations has been on air quality and the reduction of emissions. The reason for this is that air quality impacts directly affect human health. Ambient air quality standards are essentially "health-based standards." Air quality is by far the most significant potential impact to communities throughout the study area, the state, and beyond. Mobile source emissions that include goods movement are a major emissions contributor. The goods movement industry relies heavily on diesel fuel to power their vehicles. A discussion of diesel emissions and their health-based impacts is provided below. A more general discussion on goods movement modes and their respective contribution to emissions follows.

Health Impacts of Goods Movement Emissions

Air quality impacts are regionally monitored and characterized per mandate, and are quantitatively based. Regional air quality is a primary concern because issues of toxic air contaminants (TACs) and ultrafine particulate matter (PM)[7] pose known health risks to people.

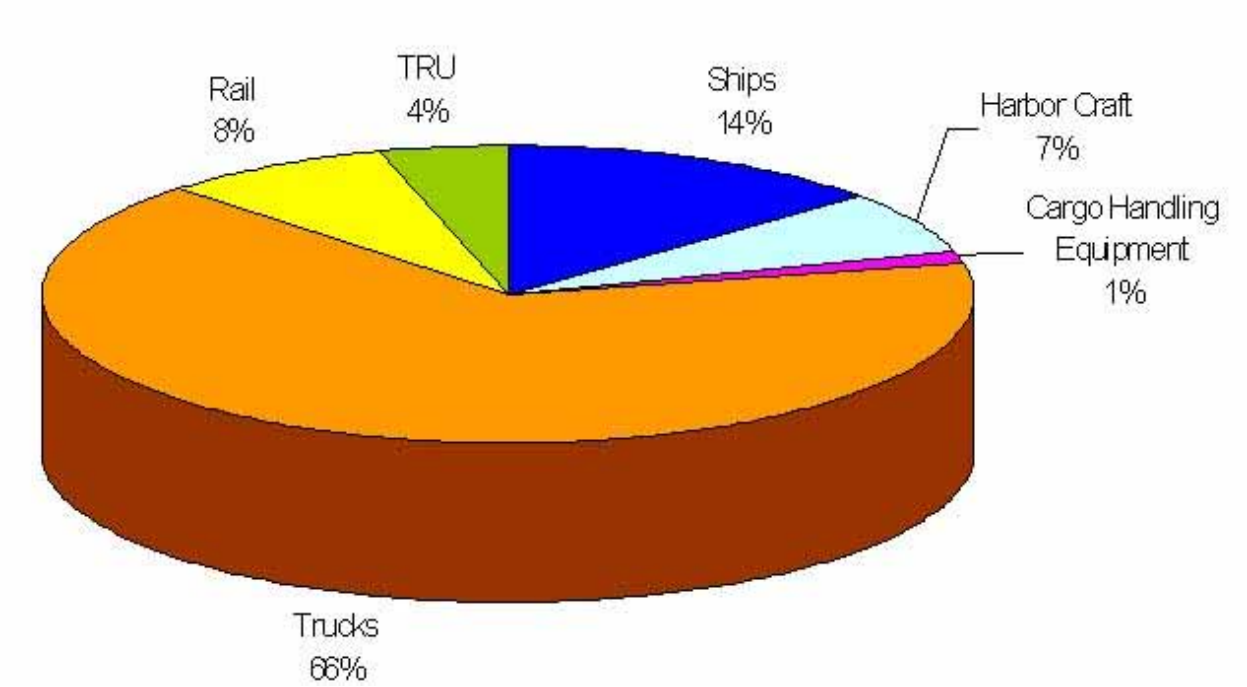
Formally defined, a TAC is "an air pollutant which may cause or contribute to an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health" (Health and Safety Code section 39655).[8] A primary TAC is diesel PM, which is emitted from all source categories associated with diesel fuel combustion. Boats, trucks, and trains associated with goods movement are the

primary sources of diesel PM. Seaport activities significantly affect the air quality within the study area due to the congregation of these mobile sources and their resulting diesel PM emissions.

As displayed in Figure 4, statewide 2001 diesel PM emissions inventory from ports and goods movement were approximately 57 tons per day, with modal contributions as follows: 66% truck emissions, 8% rail, 14% ships, 7% harbor craft, 4% transport refrigeration units (TRU), and 1% cargo handling equipment.[9]

While figures may vary by air basin (and are not available for all basins as of this printing), the significance of diesel particulate matter relating to health is firmly established. Diesel particulate matter is a cause for special concern to human health because 50 to 90 percent of the particles are very small (i.e., *ultrafine*[10]) and can readily enter into and deposit within the lungs and pass through the bloodstream to the cellular level. However, it should be noted that ultrafine particulate matter is not exclusive to diesel emissions – ultrafine particles originate from any combustion process using any fuel, including gasoline, compressed natural gas (CNG), and liquid natural gas (LNG). Combustion sources other than mobile sources include stationary, industrial, occupational, and atmospheric conversion.[11] Independently published research reinforces the emissions health risks by establishing a diesel exhaust-cancer connection. In more than 35 studies involving railroad workers exposed to occupational diesel exhaust, the excess risk of lung cancer is consistently elevated by 20-50%.[12]

Figure 4
Diesel PM Statewide 2001 Emissions from Ports and Goods Movement

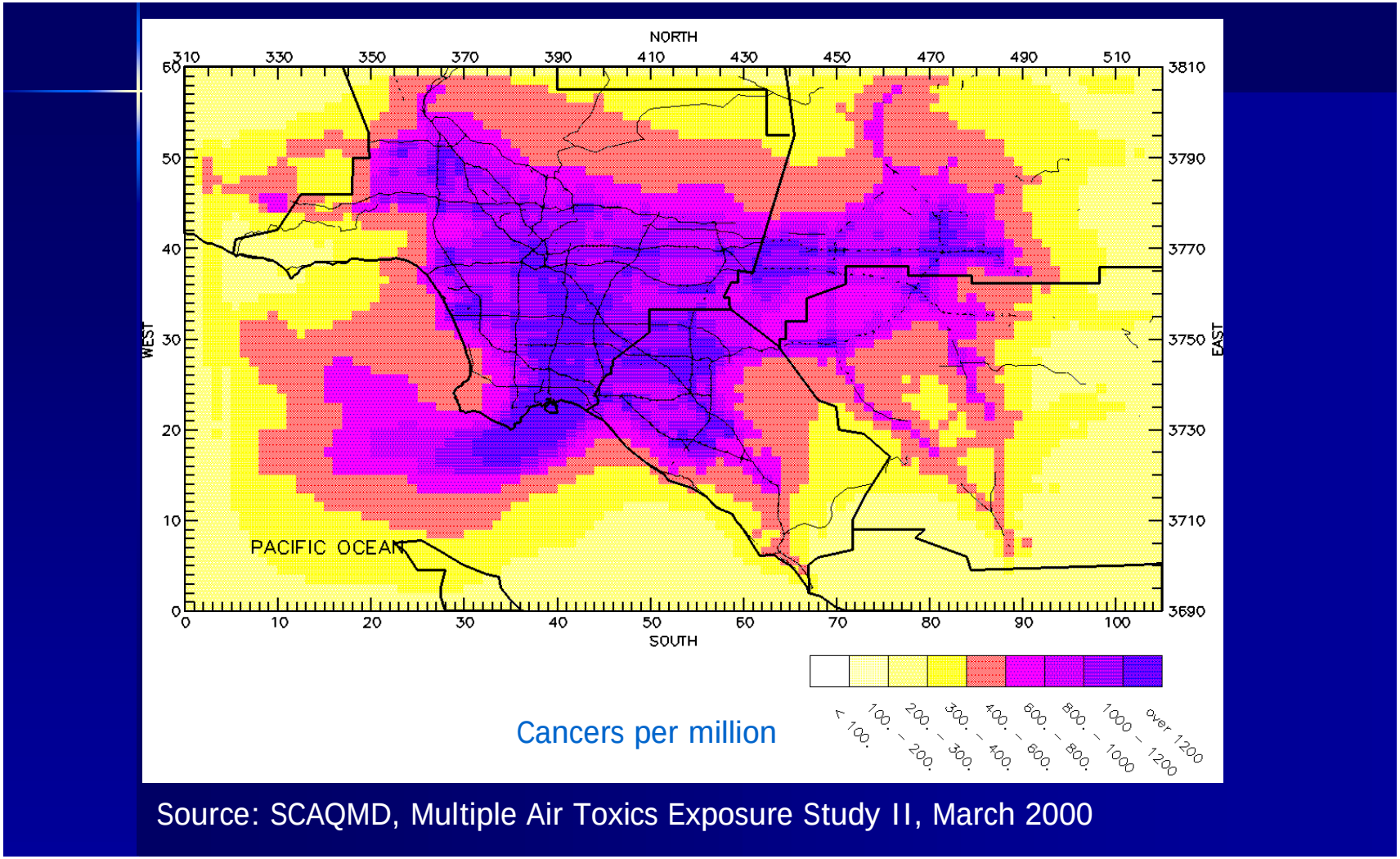


Source: Emission Reduction Plan for Ports and Goods Movement in California. California EPA and California Air Resources Board. March 21, 2006.

Carcinogenic risk refers to the increased probability that an individual exposed to an average air concentration of a chemical will develop cancer when exposed over a 70-year period. Cancer risks are

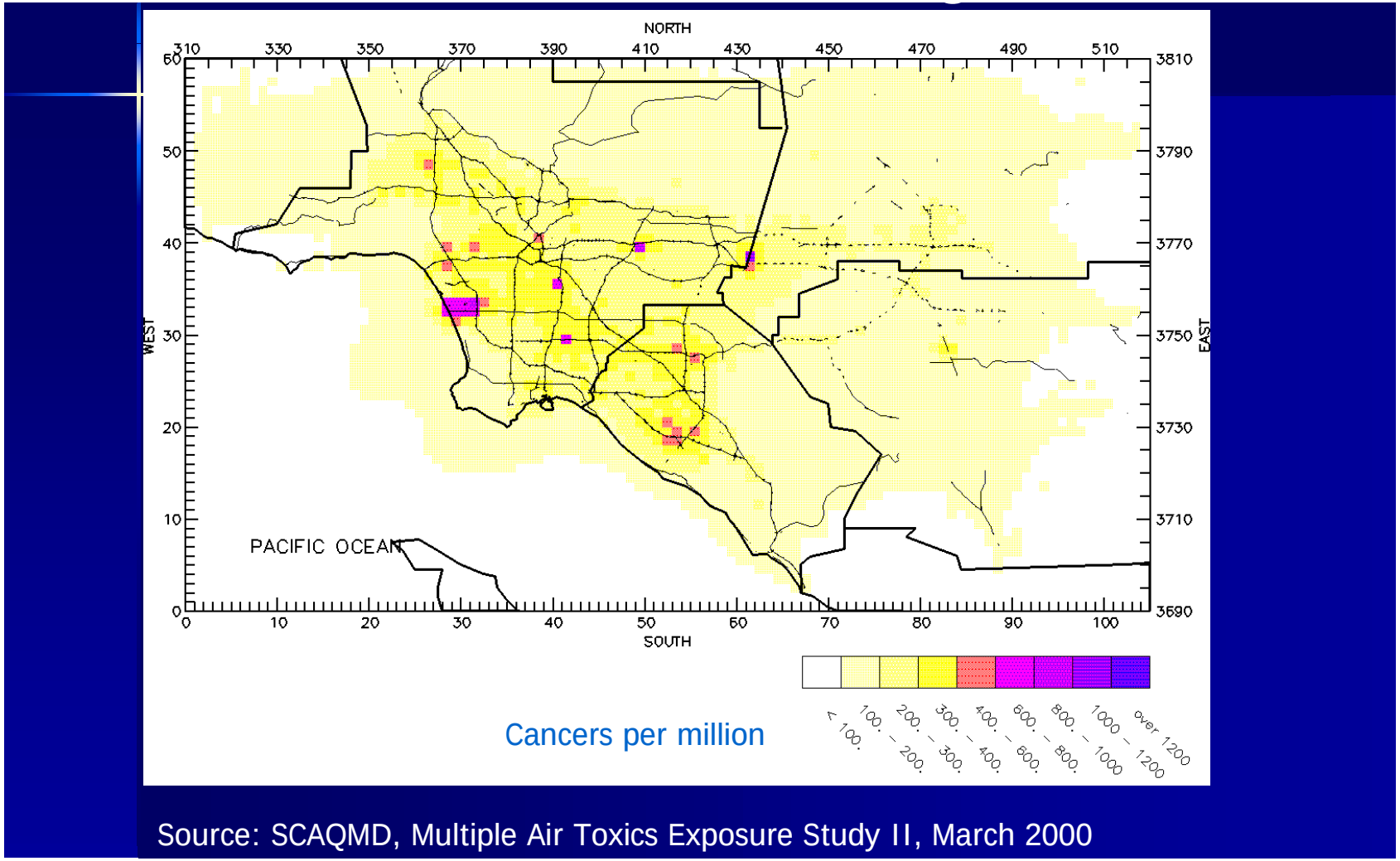
expressed on a per-million basis for comparative purposes. According to the South Coast Air Quality Management District (SCAQMD) Multiple Air Toxics Exposure (MATES-II) Study, diesel particulates account for 71% of the cancer risks (1,400 in one million) relating to pollutants in the South Coast Air Basin. For comparative purposes, Figures 5 and 6 display the cancer risk from airborne toxics with and without diesel emissions for the counties of Los Angeles, Orange, Riverside, San Bernardino, and Ventura.[13] Based on a comparison of Figures 4 and 5, and a cancer risk of 1,400 per million; individuals in areas of maximum risk are 14 times more likely to contract cancer due to diesel emissions.

Figure 5
Estimated Risk of Cancer from All Toxics: All Emission Sources



Source: SCAQMD, Multiple Air Toxics Exposure Study II, March 2000

Figure 6
Estimated Risk of Cancer from Airborne Toxics: Excluding Diesel



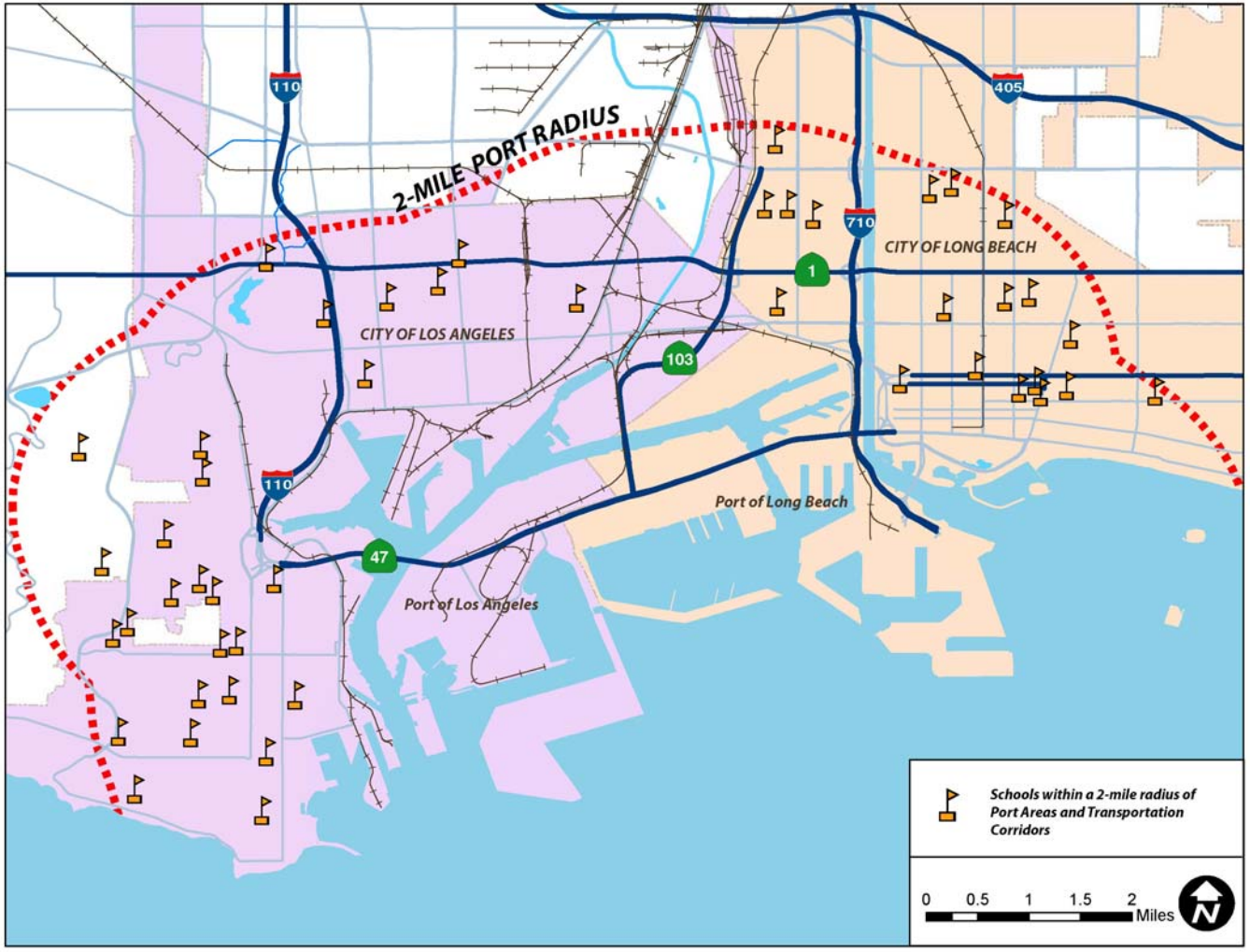
Source: SCAQMD, Multiple Air Toxics Exposure Study II, March 2000

Further health effects are attributable to diesel particulate matter according to research compiled by the Keck School of Medicine of USC[14], including increased incidences of:

- Asthma
- Preterm and low birth weight babies
- Cardiac birth defects
- Thickening of arterial walls
- Oropharyngeal (mouth and throat) cancer
- Slowed lung development in children

This can lead to concern in areas near goods movement facilities and corridors where people live and their children go to school. Additionally, recent CARB analysis shows 5,400 premature deaths (up to 14 years premature) each year in the South Coast Air Basin just due to PM2.5 pollution. CARB previously estimated that 2,400 people die prematurely each year of that in the South Coast Air Basin. Taking the study area's ports for example, 46 schools are located within 2 miles of either the Port of Los Angeles or the Port of Long Beach (i.e., San Pedro Bay ports) as displayed in Figure 7. A list of the schools is located in Appendix B.

Figure 7
Schools Located Within a 2-Mile Radius of San Pedro Bay Ports



Source: 2000 U.S. Census TIGER Data

Fortunately, there is evidence that vehicle-related pollutants decrease to "near background levels" within about 300 meters (approximately 1,000 feet) of freeways.[15] Establishing appropriate distances between community facilities and heavily traveled roadways can minimize exposure to pollutants.

Similar to diesel particulate matter emissions, NOx also poses health threats to individuals, albeit indirectly. NOx precursor emissions are required to form ground-level ozone (O_3).[16] Ozone can affect the health and condition of individuals by aggravating asthma and causing lung tissue inflammation. Children and the elderly are the most susceptible, although the U.S. EPA estimates that ozone can result in a 15 to 20% temporary decrease in lung capacity in some healthy adults.[17] In addition to the human health effects, ozone can affect the health of the surrounding physical environment, including vegetation, buildings, rubber, and some plastics. Ozone increases plant and tree vulnerability to disease, pests, and harsh weather crop yield loss.[18] This is unfortunate in part because vegetation assists in cleaning the air communities breathe through photosynthesis. Photosynthesis is a process whereby vegetation absorbs carbon dioxide and certain other pollutants, and releases oxygen.

Air Quality Impacts by Goods Movement Mode

Following is a discussion of the affect on air quality associated with the various transportation modes of goods movement: airports, seaports, railways, trucking, and warehousing and distribution centers.

Commercial service airports are a vital component to cargo movement in the U.S. While large volumes of aircraft use the study area's major airports, environmental regulatory compliance and standards for aircraft are established at the federal level. However, airport operations do affect local basin air quality and are accounted for in air quality management plans.

Major commercial service airports within the South Coast Air Basin include:

- Los Angeles International Airport
- Long Beach Airport
- John Wayne Airport (Orange County)
- Burbank/Bob Hope Airport
- Ontario International Airport

At the time of this printing, aircraft emissions data was readily available only for the South Coast Air Basin as compiled by the South Coast AQMD in their 2003 Air Quality Management Plan and is presented here in Table 5 to represent how aircraft contribute to air quality at the regional level. Data for airports in other basins in the study area are not available.

Table 5
Estimated 2005 Annual Average Aircraft Emissions in SCAB

	Pollutant (Tons per Day)				
	NOx	SOx	PM10	PM2.5	CO
Aircraft	26.53	0.95	0.65	0.65	50.79
TOTAL All Sources	975.3	58.48	291.95	112.49	4100.19
Aircraft % of Total	2.7%	1.6%	0.2%	0.6%	1.2%

Source: South Coast AQMD 2003 Air Quality Management Plan.

Commercial aircraft emissions are a growing segment of the transportation emissions inventory due to air traffic demand. This growth is occurring at a time when other significant mobile and stationary sources are drastically reducing emissions, thereby accentuating the growth in aircraft emissions. Recently, the Federal Aviation Administration (FAA) reported that flights of commercial air carriers are expected to increase by 34% from 2002 to 2020.[19]

Ground support equipment (GSE) supporting airport operations also contribute to air quality impacts at airports. GSE perform a variety of functions, including: starting aircraft, aircraft maintenance, aircraft fueling, transporting cargo to and from aircraft, loading cargo, transporting passengers to and from aircraft, baggage handling, lavatory service, and food service. As a group, GSE are largely comprised of off-road types of equipment fueled by either gasoline or diesel. Their overall contribution is relatively negligible and is combined with aircraft in emissions reporting. According to the FAA, the combined emissions from aircraft and GSE typically represent approximately three to five percent of emissions regulated under SIPs nationwide.[20]

Additional contributors to airport-related emissions are trucks transferring air cargo and passenger vehicles accessing airline terminals. Independently, these airport users contribute to air quality, with emissions increasing due to increased passenger and cargo demands, as well as added national security precautions that can delay terminal access. Additionally, interactions between these modes on airport can cause increased congestion and idling. Fortunately, this is generally minimized due to the layout of commercial airports. Airport land use typically provides for the separation of passenger and cargo facilities, generally located on opposite sides of the airfield. This segregation helps to keep ingress and egress for both modes optimized while on the airport. Further discussion on the effects of goods movement trucking is provided later in this section.

The San Pedro Bay ports (POLA and POLB) contribute significantly to air quality within the study area. Ports have such a significant impact because three major modes of goods movement transportation converge there – ships, trucks, and rail. These modes predominantly use particulate-producing diesel fuel. Not only are more diesel-powered vehicles accessing the ports due to goods movement growth, but they are also spending more time there due to port capacity constraints, thereby resulting in increased diesel emissions from idling. In addition, support vehicles such as harbor craft and cargo handling equipment typically rely on diesel fuel as well.

At the time of this printing, ship emissions data was readily available only for the South Coast Air Basin as compiled by the South Coast AQMD in their 2003 Air Quality Management Plan and is presented here in Table 6 as a representation of how ships contribute to air quality at the regional level.

Table 6
Estimated 2005 Annual Average Ship Emissions in SCAB

	Pollutant (Tons per Day)				
	NOx	SOx	PM10	PM2.5	CO
Ships & Commercial Boats	51.88	29.89	3.59	3.32	6.19
TOTAL All Sources	975.3	58.48	291.95	112.49	4100.19
Ships % of Total	5.3%	51.1%	1.2%	3.0%	0.2%

Source: South Coast AQMD 2003 Air Quality Management Plan.

Ships use a low-grade diesel fuel – commonly referred to as *bunker fuel* – that contributes significantly more particulate matter than diesel used by trucks and locomotives. In December 2005, CARB established a requirement that ocean-going vessels approaching within 24 nautical miles of the California coast must use cleaner-burning diesel fuel in their diesel-electric and auxiliary engines. This applies to both domestic and international ships to become effective January 1, 2007. From this, reductions are expected for diesel PM by 2.7 tons per day (TPD), NOx by 1.9 TPD, and SOx by 22 TPD within the first year. A movement toward the use of cold ironing is occurring to further reduce ship emissions.

Railways are a key component to the goods movement network. Railway cargo is transported on locomotives that primarily use diesel fuel. The locomotive engine is the primary source of diesel emissions associated with rail. Rail support equipment and switchers are also diesel PM contributors. Like other modes of transportation, railroad lines are becoming increasingly congested due to higher demand for rail service from both commuter and freight users. Higher usage is resulting in increased environmental impacts.

Rail emissions data for the South Coast Air Basin as compiled by the South Coast AQMD in their 2003 Air Quality Management Plan is presented here in Table 7 to represent how rail contributes to air quality at the regional level.

Table 7
Estimated 2005 Annual Average Rail Emissions in SCAB

	Pollutant (Tons per Day)				
	NOx	SOx	PM10	PM2.5	CO
Rail	31.79	3.33	1.05	0.97	6.55
TOTAL All Sources	975.3	58.48	291.95	112.49	4100.19
Rail % of Total	3.3%	5.7%	0.4%	0.9%	0.2%

Source: South Coast AQMD 2003 Air Quality Management Plan.

Rail diesel emissions are affected by fuel efficiency. According to industry figures, railroad fuel efficiency has increased by 72 percent since 1980. Then, a gallon of diesel fuel moved one ton of freight an average of 235 miles. In 2001, the same amount of fuel moved one ton of freight an average of 406 miles. Railroads and rail suppliers have reduced the weight and increased the capacity of rail cars also to improve fuel efficiency and reduce emissions. The average freight car capacity is now nearly 93 tons, up 17 percent in just the past 20 years.

Emissions caused by vehicle delays at rail crossings contribute further to air quality issues relating to goods movement rail activity. For example, simulations conducted by Leachman and Associates in the *Inland Empire Railroad Main Line Study* commissioned by SCAG demonstrate the impact caused by vehicle delay at highway-railroad grade crossings along the mainline infrastructure from downtown Los Angeles east and north to Barstow and Indio. Total vehicle hours of delay was calculated to be 2,622 hours per peak day. Assuming 300 peak days per year, extrapolation yields nearly 790,000 vehicle hours of annual delay at these crossings. The Leachman study further established year 2000 baseline emissions generated from delayed vehicles at grade crossings as follows: 9.65 tons of ROG; 100.46 tons of CO; 13.85 tons of NOx; 0.54 tons PM10; and 0.09 tons of SOx.[21] Cumulative emissions from trains and vehicles are summarized in the Table 8.

Table 8
Rail Crossing Emissions Due to Delay

	Overall Emissions for Year 2000 (Tons)				
	ROG	CO	NOx	PM10	Sox
Rail Emissions	498.43	721.29	15,424.10	347.56	958.36
Traffic Delay Emissions	9.65	100.46	13.85	0.54	0.09
Cumulative Emissions	508.08	821.74	15,4397.95	348.10	958.45

Source: Leachman and Associates LLC.

Trucks entering the rail yard to transfer freight introduce further emissions into the rail yard environment. Trucks and their effects on air quality are discussed below.

Like other modes of transportation, trucking corridors are becoming increasing congested due to higher demand from freight users. Truck engines primarily utilize diesel fuel.

Truck corridors are also shared-use facilities in that cars use the same infrastructure. An increase in automobile traffic coupled with an increase in truck traffic causes even greater congestion. This negatively affects transportation efficiency for all users by creating congestion from overlapping user groups (total number of vehicles on the road) and especially inadequate capacity during peak hours, thereby increasing idling and related emissions. In addition to unavoidable congestion-related idling, some idling is caused for purposes of cab comfort, engine warmth, and on-board auxiliaries operations and is, therefore, considered avoidable.

Truck emissions data for the South Coast Air Basin as compiled by the South Coast AQMD in their 2003 Air Quality Management Plan is presented here in Table 9 to represent how trucks contribute to air quality at the regional level.

Table 9
Estimated 2005 Annual Average Truck Emissions in SCAB

	Pollutant (Tons per Day)				
	NOx	SOx	PM10	PM2.5	CO
Trucks	216.82	2.22	4.28	3.57	35.16
TOTAL All Sources	975.3	58.48	291.95	112.49	4100.19
Trucks % of Total	22.2%	3.8%	1.5%	3.2%	0.9%

Source: South Coast AQMD 2003 Air Quality Management Plan.

While warehousing and distribution centers do not directly emit emissions per se, on-site operations relating to goods movement transport does. Like ports, warehousing and distribution centers are locations where diesel-fueled transportation modes congregate. Therefore, warehousing and distribution centers are a significant source of concentrated fuel emissions within the goods movement network.

Ports are not singular in experiencing increased bottlenecking and idling emissions due to increasing goods movement activities. Congestion at warehousing and distribution centers is not uncommon and is centered upon the following key constraints:

- Gates (points of entry)
- Docks
- Yard design and layout

Warehousing and distribution centers are the key destination point for trucks equipped with Transport Refrigeration Units (TRU). TRUs are refrigeration systems powered by diesel internal combustion engines designed to refrigerate or heat perishable products that are transported in various containers, including semi-trailers, truck vans, shipping containers, and rail cars. Although TRU engines are relatively small, the fact that they congregate in significant numbers and are a discernable source of emissions at warehousing and distribution centers results in the potential for health risks to those who live and work nearby. Since diesel particulate matter has been identified as a toxic air contaminant, CARB adopted an Airborne Toxic Control Measure (ATCM) for TRUs and TRU generator sets in February 2004 to be phased in beginning in 2008.[22] Analysis of year 2000 TRU emissions revealed a health-diesel emissions connection and is presented in Table 10 below.

Table 10
Estimated Cancer Risk versus Distance from Center of TRU Activity

Distance from Center of Source	Potential Cancer Risk
275 meters (~900 feet)	> 100 per million
1,050 meters (~3,450 feet)	>= 10 and < 100 per million

Source: *Air Quality and Land Use Handbook: A Community Health Perspective.* Cal/EPA and California Air Resources Board. April 2005.

2.5 Visual Impacts

Large goods movement service areas (ports, rail yards, and warehousing and distribution centers) are sources of undesirable visual impacts to neighboring communities. For example, there can be a lack of appropriate height controls on new structures in port pier development/redevelopment resulting in visual incongruity and intrusion in the landscape of the adjacent community.

The continuing growth of marine container terminals is causing increasing environmental concerns among neighboring communities. Container storage yards are becoming constrained as port activity increases. Additionally, fewer shipping containers are returned than are received as a result of a domestic export deficit, thus requiring local storage. The footprint of the storage yard, when not expanded, leads to the need to increase the height of container stacks. The sight of stacked containers has a negative visual aesthetic on the community. Stack heights can block an otherwise scenic vista (the coast) and can prevent natural lighting from reaching residential properties adjacent to container storage yards (shadowing). In the Wilmington area, the demand for additional storage space has resulted in a proliferation of "temporary" storage facilities near the port in areas not zoned for such use and encroachment into surrounding neighborhoods.[23]

Similar to seaports, rail yards and warehousing and distribution centers are a source of undesirable visual impacts on neighboring communities. Increased stacking of containers and operating equipment has a

negative visual aesthetic on the community. Like marine container terminals, increasingly higher stacked containers can cause shadowing on residential properties adjacent to container storage yards.

Cranes required to transfer cargo have visual impacts, as well. The height of the crane can create a visual impact, which is further compounded by crane lighting that can spill over into residential areas. Crane size/height has increased to correspond with increases in cargo container size and quantity.

Overhead-electrified catenary systems providing traction power for the locomotives, signal power for train traffic, and overhead feeders for power distribution are further visual impacts related to rail facilities.

Goods movement service areas, which operate 24 hours per day and 7 days per week (24/7), require appropriate facility lighting. A potential result of such operations is lighting spillover into residential neighborhoods. Continuous light can disrupt the sleep patterns of residents and otherwise negatively affect community quality of life. It has been suggested that artificial lighting can also negatively affect wildlife by potentially causing disorientation or confusion of biological rhythms, and potentially cause high mortality in birds attracted to brightly lit buildings or towers.[24]

In addition, increasingly congested truck corridors prompt trucks to use surface streets within neighboring communities in search of alternate routes to ports, rail yards, and distribution centers and warehouses. This is an added unwelcome intrusion whose visual effects are felt by the community.

2.6 Noise Impacts

Railway activity is a significant source of noise for people who live and work nearby. Propulsion of locomotive diesel engines creates significant noise levels. In addition to the engine, the guideway (or tracks) is a source of noise during locomotive wheel interaction. For example, tight curves can cause wheel squeal, and track joints and switches can cause audible impacts.

Train horns and crossing bells are added noise sources associated with rail. The horns are installed to warn motorists and pedestrians of an approaching train at a grade crossing. In many geographic regions and during most of the year, cars operate with windows rolled up, climate control on, and radios in use. Therefore, audible warning signals must be sufficiently loud to be perceived. Noise from idling engines coupled with blowing whistles produce a significant number of railway noise complaints, according to Illinois EPA noise advisor, Greg Zak.[25] Table 11 below summarizes the average noise level resulting from common rail activity.

Table 11
Rail Noise Levels

Rail Source	Average Noise Level From 50-feet
Horn	90 dBA
Train traveling 50 mph at grade	75 dBA
In station	65 dBA

Source: *Transit Noise and Vibration Impact Assessment Final Report*, Federal Transit Administration, April 1995.

The Federal Railroad Administration (FRA) estimates that 4.6 million people nationwide are severely affected by locomotive horns.[26]

Effective June 2005, the FRA issued a new regulation permitting the establishment of "quiet zones" to help address the issue of train horns on residential communities. Trains have been mandated to use their horns at public highway (street)-grade rail crossings for safety reasons since 1994. The new regulation provides for six types of quiet zones, ensures the involvement of state agencies and railroads in the quiet zone development process, gives communities credit for pre-existing safety warning devices at grade crossings, and addresses other issues including pedestrian crossings within a quiet zone. The establishment of a new quiet zone requires at minimum that each grade crossing be equipped with flashing lights and gates. Additional safety measures may be required to compensate for the absence of the horn as a warning device. New quiet zones can be in effect 24-hours a day or just during the overnight period between 10 p.m. and 7 a.m.

Rail noise issues arise beyond that of at-grade train operations. Increasingly, rail yards and switching facilities are at issue. Associated noise results from:

- Auxiliary equipment operations and air-release activity
- Train car coupling/uncoupling
- Locomotive and switcher[27] idling, braking, and cooling fan operation
- Rail yard PA systems and signal horns

Closely associated and interrelated with noise is the issue of vibration. The effects of ground-borne vibration from trains include detectable movement of building floors, window rattling, shaking walls, and rumbling sounds. Factors that influence ground-borne vibration include operational and vehicle characteristics, guideway type and condition, geology, and building foundation.

Trucks entering the rail yard to transfer freight introduce further source of noise into the rail yard environment, and is discussed below.

Noise from trucks comes from several different sources. Five major sources of truck noise are:

- Tires

- Exhaust systems
- Fans
- Air intake
- Mechanical (engine and drive train)

The first nationwide regulation of truck noise was established with the Noise Control Act of 1972 (P.L. 92-574-86 STAT.1234). These regulations apply to trucks greater than 10,000 pounds gross vehicle weight (GVW) and apply to total truck noise, not just exhaust noise.

Aftermarket regulations for total truck also apply. When measured at a distance of 50 feet, total truck noise is not to exceed:

- 83 dBA for 1986 models or newer
- 86 dBA for 1985 models or older

Speed is a major factor affecting truck noise. A steady vehicle speed (e.g., 60 mph) will be perceived as less noisy compared to accelerating or decelerating activity, including the use of engine (Jake) brakes. The Jake brake is an add-on engine brake for diesel engines. Heavy trucks moving freight can weigh as much as 80,000 pounds. Consequently, stopping or slowing down results in a great deal of wear on the tire brakes, which have to be replaced frequently. The Jake brake, as an engine system, causes no wear and tear and can help slow the truck before the wheel brakes need to be applied. Its primary use is on long downhill grades where the wheel brakes would otherwise have to be frequently pumped to keep the truck from gaining dangerous speed.

Pavement surface type and its interaction with truck tires also affects noise. Asphalt generally produces less noise due to its flexibility properties than does typical transversely tined Portland Cement Concrete, which is more rigid and grooved.

The noise of engine idling, in addition to contributing to air quality as discussed above, is another impact that affects communities. Due to the nature of the trucking industry, noise is a 24/7 source of community irritation. Recent programs aimed at reducing congestion at ports during peak hours have shifted more trucking operations to nighttime hours. As a result, communities near ports, distribution centers, and warehouses are exposed with increased truck noise for greater durations. Increased nighttime trucking activity appears amplified during the evening hours when ambient noise levels are lower.

Further, increasingly congested truck corridors prompt trucks to use surface streets within neighboring communities in search of alternate routes to ports, rail yards, and distribution centers and warehouses. This is an added unwelcome intrusion whose noise effects are felt by the community.

In 1990, Congress passed the Airport Noise and Capacity Act. The Act required all commercial airlines to convert their fleets from Stage 2 to Stage 3 noise certification levels (a quieter plane) by the year 2000. Since then, commercial aircraft have become quieter; however, air traffic growth is offsetting the noise reduction benefits of Stage 3 aircraft.

Jet engines are major sources of intense aircraft noise. The contribution to the overall airport noise environment of propeller-driven aircraft is relatively minor when compared to jet-powered aircraft. Jet engines are generally more powerful and produce noise of higher magnitude than turboprop or piston aircraft engines. Also, jet engines produce a greater amount of noise in the high-frequency range, thus increasing their relative annoyance factor. In jet-powered aircraft, the primary sources of engine noise are the roar of the jet exhaust stream and the high-pitched noise generated by the engine's turbo-machinery, compressor, and blades. The exhaust roar during high-speed operations and flight is created by the rapid expansion of high-velocity exhaust gases.[28]

Jet engine noise sources are readily apparent, and may even be dominant during stationary or low-speed ground operations. The high frequency whine of the engine's fans and compressors tend to be particularly annoying to most human listeners. In contrast, the loudest noise generated by propeller aircraft (typically serving general aviation) generally occurs during takeoff, when the engine is operated on a high power setting. Propeller-powered noise is composed of a wide range of frequencies, but the major portion is at the lower end of the frequency spectrum.

Aircraft noise levels are reported in units of A-weighted sound level in decibels (dBA). Noise levels of a particular aircraft at the source can differ due to variations in weight and operating procedures. Generally speaking, the lower the weight during takeoff, the lower the noise level. Aircraft noise levels from a relative distance can also differ due to variations in climate and meteorological conditions.

Closely associated and interrelated with noise is the issue of vibration. The effects of ground-borne vibration from aircraft often include window rattling and shaking walls of buildings in close proximity. Factors relating to vibration level include aircraft operating characteristics, airport approach and takeoff procedures, and building construction.

The impacts of noise from commercial service airports on the study area's surrounding communities are increasing due to increases in passenger and cargo air traffic added to an increase in residential development in the vicinity of airports. Airport noise impacts relating to the community are established using noise exposure maps that depict noise contours expressed in yearly day-night average sound levels (Ldn). In addition, 49 USC Title 14 CFR Part 150 identifies those land uses that are normally compatible with various levels of exposure to noise by individuals. Residential land uses and schools are considered compatible with airports when exposed to average noise levels below 65 dBA. Parks and open space are considered compatible when exposed to average noise levels below 75 dBA.

Recognizing that noise impacts are significant to the community, Los Angeles Worlds Airports unveiled in December 2004 the LAX Community Benefits Agreement that will, among other things, provide funding to soundproof nearby schools ($500M) and homes ($30M).[29]

In addition to aircraft noise, the rumble of trucks transporting cargo to and from airports results in noise impacts on neighboring communities. While passenger air traffic is concentrated during hours of residential activity, trucking of air cargo extends overnight. Compounding this situation are lower nighttime ambient noise levels, thus causing truck noise to be more noticeable by sensitive populations in the adjacent community.

Port-related noise emanates from several sources, most notably from cargo loading/unloading of ships, and truck and rail traffic accessing the ports. As with airports, this situation is compounded by the nature of cargo operations that extend throughout the night. During nighttime hours ambient noise levels are lower, thus causing port-related noise to be more noticeable by sensitive populations in the adjacent community. Noise from ship engines may also disturb hearing and behavior patterns of marine mammal populations, as well as feeding and nesting sites for birds.[30] Increased traffic congestion at the ports' entries necessitates idling of truck engines, contributes further noise to the area. In addition, trucks in the immediate vicinity of ports tend to use the surface streets abutting residential properties, thus creating an impact to the community.

Noise from warehousing and distribution centers is primarily associated with interfacing truck and rail traffic, which have been discussed in previously in this technical memorandum. As with seaports and airports, concentrated noise sources can negatively affect nearby sensitive populations.

2.7 Environmental Justice

Environmental justice is defined by State law as "the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies." Environmental justice violations occur when there are disproportionate impacts[31] to minority and low-income[32] communities. It is fundamentally about fairness toward the disadvantaged and often addresses the exclusion of racial and ethnic minorities from decision making. Environmental justice issues relating to goods movement arise most frequently when some minority and low-income communities suffer disproportionately from transportation programs' negative impacts, like air pollution. Environmental justice issues can also arise when some communities are less represented than others when policy-making bodies debate and decide what should be done with transportation resources. The modal capacity expansion/land use connection often raises the issue of environmental justice.

On February 11, 1994, Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, was issued. The Executive Order directs federal agencies to take necessary and appropriate steps to identify and address disproportionately high and adverse human health or environmental effects of federal projects and programs on minority and low-income populations to the greatest extend practical and permitted by law. The intent of the EO is to focus federal attention on the environment and human health conditions of minority and low-income populations with the goal of achieving environmental protection for all communities.

Environmental justice arose because of a history of actions that (a) caused effects to be predominately borne by minority or low-income populations, or effects borne by minority and low-income populations that were more severe than those borne by others (unequal effects), or (b) excluded minority or low-income groups from participating in meaningful decision making relating to industrial, governmental, and commercial operations and policies. The environmental justice (EJ) movement was started by individuals, primarily of color who sought to address the inequity of environmental protection in their communities.[33] Grounded in the struggles of the 1960s Civil Rights Movement, the EJ movement sounded the alarm about the public health dangers for their families, their communities, and themselves. Some events leading to EO 12898 include[34]:

- 1964 – Civil Rights Act is passed in the United States Congress; Title VI prohibits the use of federal funds to discriminate on the basis of race, color, and national origin.
- 1969 – The National Environmental Policy Act (NEPA) is passed in the U.S. Congress. This policy requires federal agencies to incorporate environmental values into the process of decision-making. Thinking about environmental impacts of proposed projects and considering reasonable alternatives is accomplished through Environmental Impact Statements (EIS).
- 1971 – The annul report on the U.S. Council on Environmental Quality (CEQ) acknowledges that racial discrimination adversely affects the environmental quality of urban people of color.
- 1972 – In California, Ralph Abascal of the California Rural Legal Assistance wins a court case on behalf of six nursing mothers that are California farm workers. This ultimately resulted in a DDT ban in 1972.
- 1978-1979 – In Houston, TX, residents of the black, middle-income Northwood Manor subdivision protest Whispering Pines Sanitary landfill siting in their neighborhood. Linda McKeever Bullard files suit on behalf of Northwood Manor residents, Bean v. Southwestern Waste Management. This is the first civil rights suit to challenge the siting of a waste facility.
- 1982 – In Warren County, NC, local residents and national environmental and social activists protest against the siting of over 30,000 cubic yards of polychlorinated biphenyl (PCB) contaminated soil near the economically poor and black town of Afton. This protest gained national media coverage; more than 500 protestors were arrested. This non-violent civil disobedience campaign, modeled after 1960s protests of the Civil Rights movement, coined the term "environmental racism."
- 1983 – U.S. General Accounting Office (GAO) published Siting of Hazardous Landfills and Their Correlation with Racial and Economic Status of Surrounding Communities. GAO found that:

    - 75% of off-site commercial hazardous and toxic waste landfills were in communities of color although they made up only 20% of the population.
    - 60% of Latinos and Blacks live in areas with uncontrolled toxic waste sites.

- Also, in Triana, AL, the Olin Corporation settles a $25 million lawsuit regarding DDT contamination of their town and fishing holes. Members of this tiny-all black town had the highest DDT blood serum levels ever reported in medical history. Despite the lawsuit, in 2005 the Olin Corporation continues to remediate the fishing holes to the Food and Drug Administration (FDA) safe level of DDT (5 parts per million).
- 1987 – The United Church of Christ Commission for Racial Justice publishes Toxic Wastes and Race in the United States: A National Report on the Racial and Socioeconomic Characteristics of Communities with Hazardous Waste Sites. This report found that race was the most significant factor in determining where a waste facility was located. Moreover, 3 out of 5 Black and Latino Americans communities and 1 of 2 Asian-Pacific Islander Americans and American Indians lived with at least one uncontrolled toxic waste site in their neighborhood.
- 1991 – In Kettleman City, CA, a judge rules in the El Pueblo para el Aire y Agua Limpio v County of Kings case that the permit process for a toxic waste incinerator is unsound. Moreover, the judge found that the local community was not "meaningfully involved" due to the failure to translate documents into Spanish.

The term "environmental justice" carries with it two associations. The community-at-large associates environmental justice with any existing condition perceived to be of negative consequence to low income and minority neighborhoods. From a statutory perspective under NEPA, the meaning is much more specific and certain qualifiers must exist in order for an impact to bear such consideration. A key factor to be weighed is the effect of a new project and its future impact. Under NEPA, the issue of "disproportionate impact" to minorities and low-income populations of proposed federal "actions" or projects generally must be demonstrated, as it was in several of the events listed above. It is not the purpose of NEPA to address existing social inequities or to remedy existing environmental problems.

A 2005 study established a link in heavily traveled corridors in southern California and the risk of childhood asthma, using a population group that was 55% Hispanic, and a substantial number were non-minority (refer to Figure 8 for the study area).[35] Clearly, there exists an environmental health issue for children of any race living near heavily traveled corridors. While community members may consider this an environmental justice violation, the goal of this Multi County Goods Movement Action Plan, in addition to the various agency plans discussed in Section 1 of this document, is to reduce the risk of impacts to all populations from goods movement activity as the industry continues to grow.

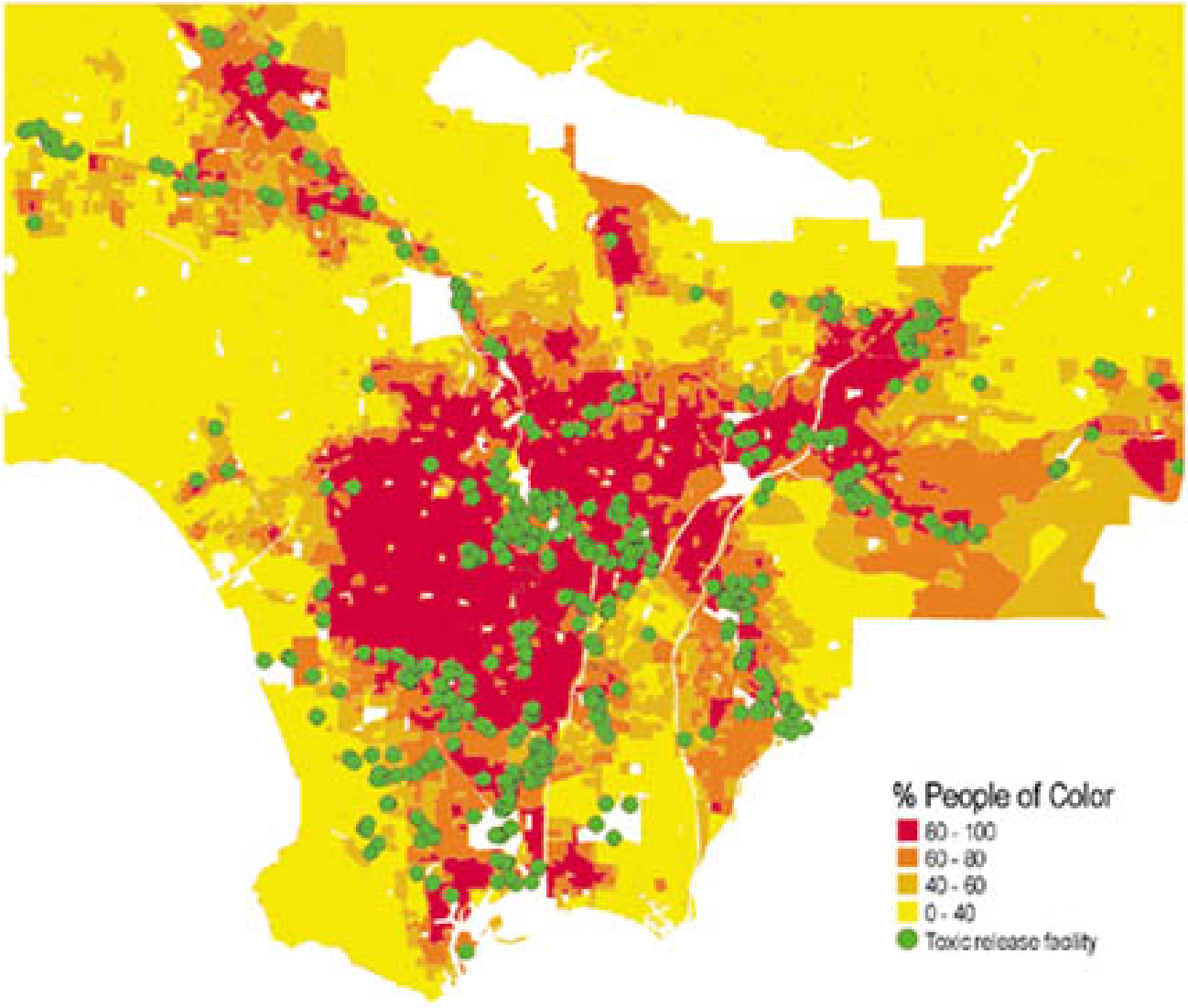
Environmental justice is of particular concern in the communities surrounding the ports (Long Beach, Los Angeles, Hueneme, and San Diego). Some key facts are:

- According to the 2000 census, approximately 23% of the population in the City of Long Beach was below the poverty line, and approximately 67% of the population was defined as a minority group.
- In the City of Port Hueneme, the 2000 census identified approximately 12% of the population living below the poverty line and approximately 43% of the population was defined as a minority group.
- Of the City of Los Angeles' 3.9 million residents, 70,000 live in San Pedro, a working class community where about two-thirds of residents are Latino, and 22 percent live below the poverty line.[36]
- In the Barrio Logan neighborhood surrounding the Port of San Diego, the 1990 census identified approximately 41% of the population living below the poverty line and approximately 93% of the population was defined as a minority group.

Figure 8 highlights environmental justice concerns throughout the MCGMAP region.

Figure 8

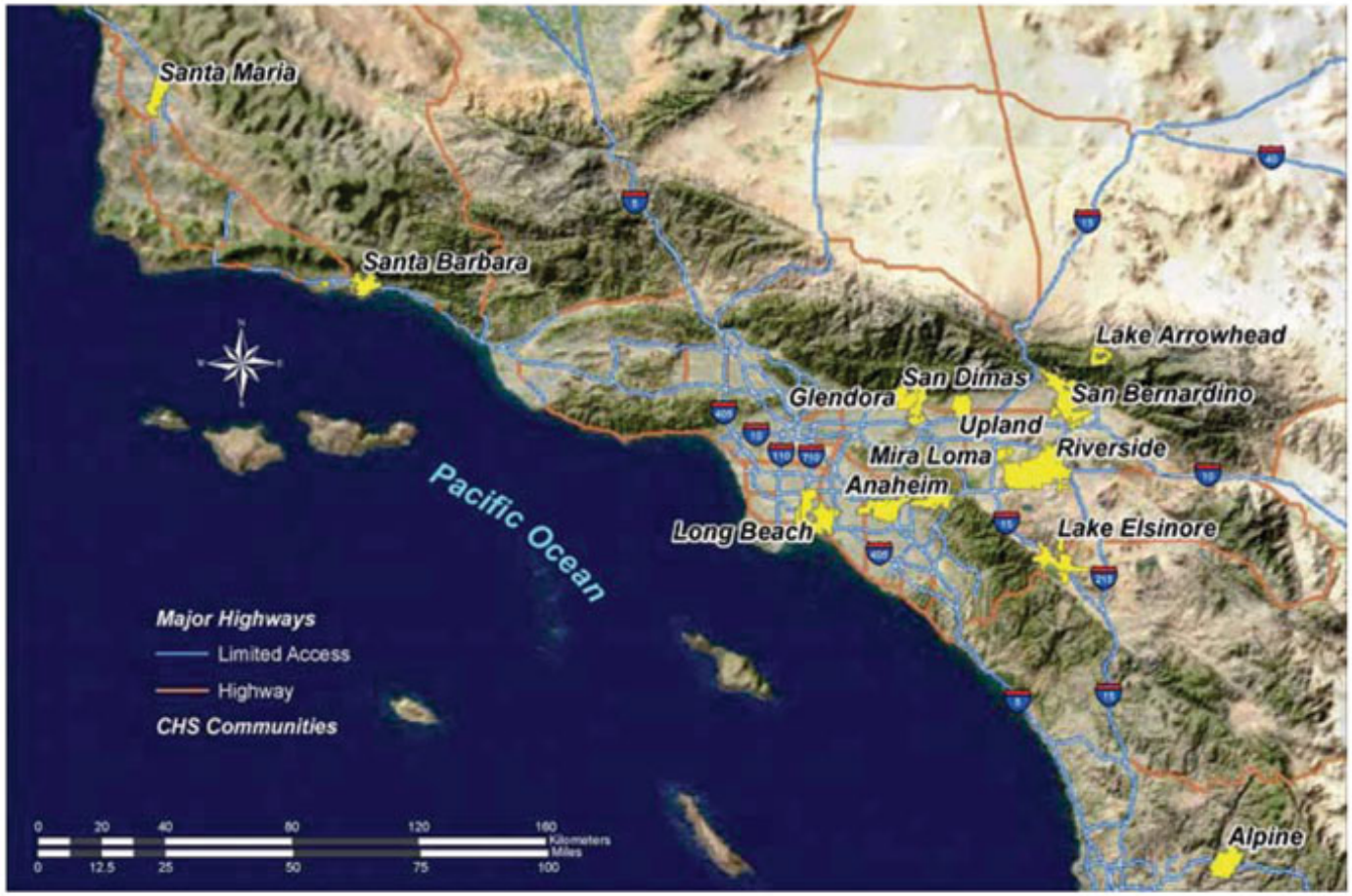
Toxic Release Facilities Relative to Racial/Ethnic Composition of Neighborhoods, Los Angeles, 1996



Reproduced with permission from Communities for a Better Environment, "Holding Our Breath", 1998.

Source: McConnell, Rob et al. "Traffic, Susceptibility, and Childhood Asthma." *Environmental Health Perspectives*, Vol. 114, Number 5, May 2006. Viewable at www.ehponline.org/members/2006/8594/8594.html

Figure 9
Traffic, Susceptibility, and Childhood Asthma in the Study Area



Source: ibid

2.8 Water Quality & Wetlands

Storm water runoff at ports is a primary concern with respect to water quality. Sediments, mainly contaminated, are an issue associated with runoff. Accumulated when precipitation travels across paved surfaces, deposits from air pollution, automotive fluids, pesticides, sediments, nutrients, and metals are released into the storm system. Storm water is the largest source of pollution and water quality impairment in U.S. coastal waters and the second-largest source of water pollution in U.S. estuaries.[37] Port waste sumps (constructed for the disposal of oil field residuals, solvents, paint sludge and other industrial wastes) are a source of wetland and groundwater contamination as rainwater runs through the pollutants and deposit into the seaports' harbors.

Operations to improve port operations pose added environmental risks to water quality. Dredging deeper channels and harbors has a tendency to increase water turbidity (cloudiness), harm habitat, and disturb or kill threatened and endangered species. In addition, dredged sediment is of concern to water quality. It is estimated that five to ten percent of dredged sediment nationwide is contaminated with toxic chemicals, including polychlorinated biphenyls (PCBs), mercury and other heavy metals, polycyclic aromatic hydrocarbons, and pesticides.[38] Sediment deposits from filling coastal land at ports to increase surface area can disrupt tidal influence necessary for vital coastal wetlands.

Diesel fuel from ship exhaust affects the quality of water and the vitality of marine life in and around port harbors. Pollutants can result in hypoxia – the condition where water has extremely low dissolved oxygen content typically insufficient to support marine life. Ship emissions can also result in the eutrophication of coastal ecosystems.[39] Eutrophication is a process whereby water bodies receive excess nutrients that stimulate excessive plant growth (algae, nuisance plants, and weeds). This enhanced plant growth, often called an algal bloom, reduces dissolved oxygen in the water when dead plant material decomposes and can cause other organisms to die. Other water quality impacts may include bacterial and viral contamination of commercial fish and shellfish, and bioaccumulation of certain toxins in fish.

Marine shipping of hazardous materials (HAZMAT) cargo could negatively affect water quality in an incident involving the accidental release of such cargo. The resulting coastal water contamination would thus pose health risks to marine life and recreational users.

Ships carrying ballast water for vessel stability and ease of steering and propulsion are frequently discharged in port areas. The release of ballast water is significant to introducing aquatic invasive alien species into U.S. waters. As summarized within the US-Thailand Free Trade Agreement IER, "A growing body of evidence points to commercial marine traffic as a source of dispersal both for marine species and pathogens. Pathogens identified in ballast water include Clostridium perfringins, Salmonella species, Escherichia coli, Vibrio cholerae, and enteroviruses. Public health impacts include paralytic shellfish poisoning, which can cause severe illness or death in humans. The risks exist in part because the water in many international ports is highly contaminated with sewage and agricultural runoff. In addition to pathogens, ballast water may also transfer micro-algae, including those species known to form harmful algae blooms or red tides."[40]

In addition to the marine life impacts, the effect of poor port water quality affects recreational use of coastal waters by the community. Recreational users risk exposure to potential harmful bacteria hosted by poor water quality.

The same issues posed by stormwater runoff to coastal wetlands also affect inland wetlands. These wetlands are most common on floodplains along rivers and streams (riparian wetlands), in isolated depressions surrounded by dry land (for example, playas, basins, and "potholes"), along the margins of lakes and ponds, and in other low-lying areas where the groundwater intercepts the soil surface or where precipitation sufficiently saturates the soil (vernal pools and bogs). Many of these wetlands are seasonal (they are dry one or more seasons every year), and, particularly in the arid and semiarid West, may be wet only periodically. The quantity of water present and the timing of its presence in part determine the functions of a wetland and its role in the environment. Even wetlands that appear dry at times for significant parts of the year – such as vernal pools – often provide critical habitat for wildlife adapted to breeding exclusively in these areas. Runoff from inland goods movement activities (rail yards, transportation corridors, and warehousing and distribution centers) has the potential to negatively affect these wetlands.

Of note are airports and their often-unique relationship to wetlands in the region. While typical goods movement expansion activities can displace existing wetlands, airports located near water sources have evolved into a sort of wetlands protector, as well. Due to airport land use compatibility issues, adjacent airport development is restricted. Therefore, adjoining wetlands experience limited displacement from off-airport development. Interestingly, wetlands near airports present safety hazards to aircraft–birds attracted to wetlands can cause minimal to extensive damage to aircraft and potentially cause the loss of life. The situation is most dangerous when bird strikes directly impact aircraft engines.

2.9 HAZMAT Movements

During hazardous materials (HAZMAT) movements, potential releases of hazardous materials pose risks to the environment and communities near goods movement corridors and facilities. The potential for a release can be summarized during three general scenarios:

1. Hazardous materials transport
2. Fueling operations
3. Fuel storage

All three scenarios are applicable to commercial service airports. The transporting of HAZMAT via aircraft is primarily viewed as a safety issue to passengers and aircraft operators. The issue is regulated by federal hazardous material transportation law in 49 USC 5101 et seq. and 49 CFR Part 175. However, there is potential that a safety accident could release HAZMAT materials into the airport environment. This occurrence is relatively rare and the small quantities released are an insignificant contribution to regional environmental quality. However, there are federal reporting requirements.

Airport fueling operations are an area with significant HAZMAT implications. Of major concern is the potential for fuel spills that could be released into the storm drain system and reach navigable waters of the U.S. Therefore, commercial service airports implement operational safeguards and programs to prevent

these occurrences and to minimize their impacts should they occur. The safeguards and programs are in compliance with NFPA 407 (Standard for Aircraft Fuel Servicing), 14 CFR Part 139.321 (Federal Commercial Airport Certification), and AC 150/5230-4A (Aircraft Fuel Storage, Handling, and Dispensing on Airports).

Fuel storage is a final area of major concern for airports in relation to HAZMAT. Commercial service airports like LAX store aviation and ground vehicle fuel in expansive storage tanks (up to 1.26 million gallons, or 30,000 barrels), either above ground or below ground in underground storage tanks (UST). Potential ground water contamination is a key concern. Therefore, airports comply with federal regulations and standards pertaining to the operation, corrosion protection, release detection and reporting of USTs (40 CFR Parts 280 and 281). In addition, large commercial service airports are required to comply with the federal Oil Pollution Prevention regulation (40 CFR Part 112) for Spill Prevention Control and Countermeasures (SPCC) Plans. SPCC Plans are a cornerstone of EPA's strategy to prevent oil spills from reaching our Nation's waters. Unlike oil spill contingency plans that typically address spill cleanup measures *after* a spill has occurred, SPCC Plans ensure that facilities put in place containment and other countermeasures that would prevent oil spills from reaching navigable waters. Under EPA's Oil Pollution Prevention regulation, facilities must detail and implement spill prevention and control measures in their SPCC Plans. A spill contingency plan is required as part of the SPCC Plan if a facility is unable to provide secondary containment (e.g., berms surrounding the oil storage tank).

Transport of HAZMAT materials via ships, rail, and truck includes transportation of bulk liquid chemicals and liquefied gases, hazardous bulk solids, and packaged hazardous cargoes. Ships may also transport hazardous materials used as ships' stores and used for shipboard fumigation of cargo. Potential releases into the environment could occur during ship docking operations and during cargo transfer for all modes. The potential for fuel spills and leaks during fueling transfers, operations, and storage exists where releases could enter into the storm drain system and reach navigable waters of the US. Therefore, each goods movement facility is responsible for implementing operational safeguards and programs (like those discussed above for airports) to prevent these occurrences and to minimize their impacts should they occur.

The potential for HAZMAT accidents during transit by rail and truck are increasing due to (1) the stand-alone increase in freight activity for rail operators, (2) the increase in potential safety conflicts between freight and commuter rail, and (3) the increase in potential safety conflicts at grade crossings with vehicular traffic. If accidents were to occur for any of these reasons, communities within the vicinity could be exposed to HAZMAT materials via toxic releases into the air or through soil and groundwater contamination if not properly contained or remediated.

As with the goods movement transportation modes above, warehousing and distribution centers handle bulk liquid chemicals and liquefied gases, hazardous bulk solids, and packaged hazardous cargoes. Potential releases into the environment could occur en route during cargo transfer and storage. The increased potential for HAZMAT accidents are due to the larger quantities and increased frequencies of goods movement resulting from trade demands.
Warehousing and distribution centers are unique in that some centers are constructed specifically for HAZMAT warehousing. Primarily established for the agricultural and high tech manufacturing industries, these specialized HAZMAT facilities are constructed to house chemicals requiring specific flammable,

oxidizer, and temperature-control space. The warehousing and distribution center sector segregates these specialized facilities from general commodities facilities (which handle typical consumer goods.)

Similar to the other goods movement modal facilities, the potential for fuel spills and leaks during fueling transfers, operations, and storage exists where releases could enter into the storm drain system and reach navigable waters of the US. While warehousing and distribution centers have their own fueling systems permanently located on-site, some are designed for the exchange of depleted tanks by contracted service providers. Regardless of the fuel storage supply, these facilities implement operational safeguards and programs to prevent these occurrences and to minimize their impacts should they occur.

2.10 Safety

Railroad crossing safety is a consideration as travel demand for rail (passenger and freight) and passenger vehicles increase. A highway-railroad grade crossing is an intersection where a roadway crosses railroad tracks at the same level. Because many crossings are located in populated areas, the blocking of a crossing by a train can be frustrating, time-consuming, and cause potentially dangerous situations. Such situations can ensue when emergency vehicles are unable to cross, when drivers attempt to "beat the train" to avoid long waits, or school bus drivers are distracted by the noise and activity inside their bus. The potential for these scenarios to occur more frequently could rise as travel demand increases.

With the recent federal regulation allowing quiet zones under certain conditions, the reduction of train horns at crossings in residential communities does have safety implications. The regulation does address this concern and results are to be monitored.

In spite of the potential risks, the FRA announced in March 2006 that train accidents and derailments declined in 2005, and that the highway-rail grade crossing collision rate is at an all-time record low. U.S. Transportation Secretary Norman Y. Mineta announced, "Amid a strong economy and increased demand for rail services in 2005, the number of overall train accidents and derailments declined according to the latest statistics compiled by the Federal Railroad Administration."[41]

Since 1995, the highway-rail grade crossing collision rate has declined from 6.92 to 3.84 per million train miles.[42] Preliminary full year data comparing 2005 with 2004 shows that overall train accidents decreased 7.9 percent, including an 8.4 percent reduction in the number of derailments. In addition, the total number of highway-rail grade crossing fatalities declined 3.5 percent and the grade crossing collision rate reached an all-time record low of 3.81 per million train-miles. The preliminary data also reveals that human-factor caused train accidents—the leading cause of all train accidents—decreased 12.8 percent in 2005. Trespassing remains the largest single cause of rail-related fatalities accounting for 53.7 percent of the total.[43]

That being said, the FRA has recently announced a renewed focus on improving the safety at the nation's largely unregulated private highway-rail grade crossings. Private crossings are owned by private property owners primarily to allow roadway access over railroad tracks to residential, commercial, or agricultural areas not meant for general public use. Each year, about 400 accidents, and between 30 and 40 fatalities, occur at the over 94,000 private crossings used by both freight and passenger trains.[44]

In addition, U.S. Transportation Secretary Mineta is calling for the universal implementation of a toll-free emergency notification system at all public grade crossings.

In a FRA report, toll-free emergency telephone numbers posted at highway-rail grade crossings used to report problems with warning equipment or other emergencies have been found effective in enhancing motorist and rail passenger safety.[45] The report determined that malfunctioning warning lights and gates at grade crossings have been repaired more quickly by railroads thanks to people using the telephone number. Also, freight and passenger trains have been slowed or stopped to prevent collisions with stalled vehicles, trespassers, and other obstructions on the tracks. Currently, such an emergency number is posted at over 75 percent of grade crossings with flashing lights and gates, and over 60 percent of all public grade crossings.

To accommodate ever-increasing passenger rail and freight demands, shared-track usage is occurring more frequently. More traffic on railways could give rise to an increase in potential safety conflicts between rail users. While the most salient risk involving shared track operations is that of a collision between a light rail transit vehicle and a freight railroad vehicle, a Federal Transit Administration (FTA) report asserts that this type of accident has never occurred.[46, 47] Sharing of track between light rail and freight railroad vehicles on the general railroad system results in little or nor additional risk to passenger compared to non-shared track transit operations, in the opinions of "knowledgeable persons in transit and insurance industries" based on limited cases and statistical evidence.[48]

Highway corridors are also shared-use facilities in that passenger vehicles and trucks use the same infrastructure. An increase in automobile traffic coupled with an increase in truck traffic causes even more congestion and more points of potential conflicts while users vie for lane presence. Trucks are at a disadvantage from preemptively avoiding collisions – they contain significant blind spots, are slower to stop, need greater stopping distance, possess less lateral vehicle responsiveness, and cause significant physical impacts due to their size and weight.

Further, increasingly congested freeway corridors prompt trucks to deviate and use surface streets within neighboring communities in search of alternate routes to enter ports, rail yards, and distribution centers and warehouses. This added unwelcome intrusion into the surrounding community could create conflict between trucks and passenger cars and trucks and pedestrians, thereby creating greater safety risks to trucks, cars, and pedestrians.

As a stationary source, warehousing and distribution centers do not pose safety issues per se. However, they do serve as a goods movement traffic generator. Therefore, related safety issues associated with trucks and rail do arise as discussed above.

E.0 – Executive Summary

[1] *The California Almanac of Emissions and Air Quality – 2006 Edition*. p. 114. California Air Resources Board.

[2] *ibid.*

[3] The area is in non-attainment for both state PM10 and PM2.5.

[4] Emission Reduction Plan for Ports and Goods Movement in California. California EPA and California Air Resources Board. March 21, 2006.

[5] PM2.5 refers to particulate matter that is 2.5 micrometers or smaller in size (approximately 1/30 the size of a human hair.)

[6] *The California Almanac of Emissions and Air Quality – 2006 Edition*. California Air Resources Board.

[7] New Emission Standards for New Commercial Aircraft Engines" EPA Office of Transportation and Air Quality, November 2005.

[8] One nautical mile is equal in length to 6,076 feet or 1.15 statute miles, which is the distance of one minute of longitude measured at the equator.

[9] United States Trade Representative, established by federal law, plays the leading role in the development of policy on trade and trade-related investment, as well as in the coordination of the interagency process on trade policy formulation.

[10] *2003 Air Quality Management Plan*. South Coast Air Quality Management District. p. ES-1.

[11] *San Pedro Bay Ports Clean Air Action Plan – Technical Report*. Port of Los Angeles and Port of Long Beach. p. 139.

[12]*Appendix C – Performance Measures*. 2004 Regional Transportation Plan, Southern California Association of Governments (SCAG).

[13] *Chapter 2- Transportation Planning Challenges and Trends*. 2004 Regional Transportation Plan, Southern California Association of Governments (SCAG).

[14] Reebie Associates, et al*. Draft Rail Freight Solutions to Roadway Congestion – Interim Report on Transportation Trends, Road-to-Rail Diversion and Model Elements for Decision-Making*. National Cooperative Highway Research Program, Transportation Research Board. April 2004.

[15] *FHWA Freight Management Study* . Federal Highway Administration, Office of Operations. Viewable at http://www.ops.fhwa.dot.gov/freight/freight_analysis/reg_ind_studies/so_cal_study.htm

[16] Portway Extensions Concept Development Study – Final Report, September 26, 2003. New Jersey Department of Transportation.

[17] Emission Reduction Plan for Ports and Goods Movement in California. California EPA and California Air Resources Board. March 21, 2006.

[18] "Methods and Characterization of Ultrafine Particles in Various Engine Exhaust Aerosols." SCAQMD Ultrafine Particle Conference. Presented by Alberto Ayala, California Air Resources Board. April 30 – May 2, 2006.

[19] Garshick et al. "Lung Cancer in Railroad Workers Exposed to Diesel Exhaust." Environmental Health Perspectives, Vol. 112, Number 15, November 2004.

[20]Southern California's Freight Movement Challenge. PowerPoint Presentation, SCAG and SANBAG, June 21, 2005. Viewable at http://www.scag.ca.gov/goodsmove/pps/SoCalFreightChallenge.ppt.

[21] Goods Movement, Traffic, and Health: Research Connections. November 2005. Presentation by Ed Avol. Viewable at http://www.scag.ca.gov/goodsmove/.

[22] Traffic Pollutants and Health Effects Advisory. South Coast Air Quality Management District. May 20, 2005.

[23] Other precursor emissions affect ozone; however, Goods Movement-related diesel emissions are not significant sources of these other precursors.

[24] Health and Environmental Effects of Ground-Level Ozone – Fact Sheet. US EPA Office of Air and Radiation. July 17, 1997.

[25] "New Emission Standards for New Commercial Aircraft Engines" EPA Office of Transportation and Air Quality, November 2005.

[26] Voluntary Airport Low Emission Program Technical Report. Office of Airports, Federal Aviation Administration. September 30, 2005.

[27] *Inland Empire Railroad Main Line Study – Final Report*. Leachman and Associates LLC for Southern California Association of Governments. June 30, 2006.

[28]Air Quality and Land Use Handbook: A Community Health Perspective. Cal/EPA and California Air Resources Board. April 2005.

[29] Southern California Regional Freight Study. FHWA Freight Management Study http://www.ops.fhwa.dot.gov/freight/freight_analysis/reg_ind_studies/so_cal_study.htm

[30] Cal/EPA Children's Environmental Risk Reduction Plan – Wilmington Local Advisory Meeting. April 3, 2006.

[31] Interim Environmental Review of the United States-Thailand FTA. Office of the U.S. Trade Representative. November 2005.

[32] Aftandilian, Dave. "Noise Pollution," Chicago Conscious Choice, June 1999. Article viewable at http://ww.consciouschoice.com/1999/cc1206/note1206.html.

[33]Transit Noise and Vibration Impact Assessment Final Report, Federal Transit Administration, April 1995.

[34] *Final Environmental Impact Statement – Interim Final Rule for the Use of Locomotive Horns at Highway-Rail Grade Crossings*. Federal Railroad Administration. December 5, 2003.

[35] "The History [Environmental Justice]." University of Washington, Department of Environmental and Occupational Health Sciences. Viewable at http://depts.washington.edu/envhlth/info/env_justice/history.html.

[36] Interim Environmental Review of the United States-Thailand FTA. Office of the U.S. Trade Representative. November 2005.

[37] *ibid*.

[38] *ibid*.

[39] *ibid*.

[40] Reducing Shipping Emissions of Air Pollution—Feasible and Cost-effective Options. Clean Air Task Force, Bluewater Network, European Environmental Bureau, European Federation for Transport and Environment, North Sea Foundation, Seas at Risk, Swedish NGO Secretariat on Acid Rain. Date unpublished. Viewable at http://www.westcoastdiesel.org/files/clearinghouse-marine//MEPC%20Reduction%20Options.doc

[41] "Train Accidents and Derailments Decline in 2005, Highway-Rail Grade Crossing Collision Rate at All-Time Record Low." March 21, 2006, Press Release. Federal Railroad Administration.

[42] "FRA Promotes Highway-Rail Grade Crossing Safety and Trespass Prevention with Grant to Operation Lifesaver, Inc." June 01, 2006, Press Release. Federal Railroad Administration.

[43] "FRA Administrator Announces Start of National Discussion on Improving Safety at Private Highway-Rail Grade Crossings." July 26, 2006, Press Release. Federal Railroad Administration.

[44] *Sharing of Track by Transit and Freight Railroads: Liability and Insurance Issues – Final Report*. Federal Transit Administration. September 2005.

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[1] *The California Almanac of Emissions and Air Quality – 2006 Edition*. p. 114. California Air Resources Board.

[2] *ibid.*

[3] United States Trade Representative, established by federal law, plays the leading role in the development of policy on trade and trade-related investment, as well as in the coordination of the interagency process on trade policy formulation.

[4] "Southern California Comments on the Interim Environmental Review of US-Thailand Free Trade Agreement," January 6, 2006, via electronic mail. Southern California organizations represented: Southern California and San Bernardino Associations of Governments, Riverside County Transportation Commission, Orange County Transportation Authority, Counties of Riverside and Long Beach.

[5] "New Emission Standards for New Commercial Aircraft Engines" EPA Office of Transportation and Air Quality, November 2005.

[6] One nautical mile is equal in length to 6,076 feet or 1.15 statute miles, which is the distance of one minute of longitude measured at the equator.

[7] The California Almanac of Emissions and Air Quality – 2006 Edition. California Air Resources Board.

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[9] http://www.arb.ca.gov/planning/sip/2007casip.htm

[10] *2003 Air Quality Management Plan*. South Coast Air Quality Management District. p. 4-2.

[11] *ibid*. p. ES-1.

[12]*San Pedro Bay Ports Clean Air Action Plan – Technical Report*. Port of Los Angeles and Port of Long Beach. p. 139.

Section 2.0 – Environmental and Community Impacts

[1] Appendix C – Performance Measures. 2004 Regional Transportation Plan, Southern California Association of Governments (SCAG).

[2] Chapter 2- Transportation Planning Challenges and Trends. 2004 Regional Transportation Plan, Southern California Association of Governments (SCAG).

[3] Reebie Associates, et al*. Draft Rail Freight Solutions to Roadway Congestion – Interim Report on Transportation Trends, Road-to-Rail Diversion and Model Elements for Decision-Making*. National Cooperative Highway Research Program, Transportation Research Board. April 2004.

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[5] *ibid*.

[6] Portway Extensions Concept Development Study – Final Report, September 26, 2003. New Jersey Department of Transportation.

[7] Ultrafine particulates average 0.02 micrometers (um). For comparative purposes, the diameter of a human hair averages 60um.

[8] CARB Almanac 2006 – Chapter 1: Introduction. p. 7. http://www.arb.ca.gov/aqd/almanac/almanac06/almanac06.htm.

[9] Emission Reduction Plan for Ports and Goods Movement in California. California EPA and California Air Resources Board. March 21, 2006.

[10] Ultrafine particulates average 0.02 micrometers (um). For comparative purposes, the diameter of a human hair averages 60um.

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[16] Other precursor emissions affect ozone; however, Goods Movement-related diesel emissions are not significant sources of these other precursors.

[17] Health and Environmental Effects of Ground-Level Ozone – Fact Sheet. US EPA Office of Air and Radiation. July 17, 1997.

[18] Heagle, S. and M. Munster. Effects of Ozone Air Pollution on Plants. United States Department of Agriculture. 1998 .

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[21] *Inland Empire Railroad Main Line Study – Final Report*. Leachman and Associates LLC for Southern California Association of Governments. June 30, 2005.

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[23] Cal/EPA Children's Environmental Risk Reduction Plan – Wilmington Local Advisory Meeting. April 3, 2006.

[24] Interim Environmental Review of the United States-Thailand FTA. Office of the U.S. Trade Representative. November 2005.

[25] Aftandilian, Dave. "Noise Pollution," Chicago Conscious Choice, June 1999. Article viewable at http://ww.consciouschoice.com/1999/cc1206/note1206.html.

[26] *Final Environmental Impact Statement – Interim Final Rule for the Use of Locomotive Horns at Highway-Rail Grade Crossings*. Federal Railroad Administration. December 5, 2003.

[27] A switcher is a small railroad locomotive intended not for moving trains over long distances but rather for assembling trains ready for a road locomotive to take over, disassembling a train that has been brought in, and generally moving railroad cars around.

[28] "Effects of Aircraft Noise and Sonic Booms on Domestic Animals and Wildlife: A Literature Synthesis," U.S. Air Force and U.S. Department of the Interior, June 1988.

[29] Wood, Daniel B. "In Los Angeles, A Unique Plan to Dull the Roar of Jets" Christian Science Monitor. December 21, 2004.

[30] Interim Environmental Review of the United States-Thailand FTA. Office of the U.S. Trade Representative. November 2005.

[31] *Disproportionate impact* defined as effects that are predominately borne by a minority or low-income populations, or effects borne by minority and low-income populations that are more severe than those borne by others.

[32] *Low-income* generally defined as a person's household income is at or below the poverty level.

[33] "Basic Information [Environmental Justice]." U.S. Environmental Protection Agency. Viewable at http://www.epa.gov/compliance/basics/ejbackground.html.

[34] "The History [Environmental Justice]." University of Washington, Department of Environmental and Occupational Health Sciences. Viewable at http://depts.washington.edu/envhlth/info/env_justice/history.html.

[35] McConnell, Rob et al. "Traffic, Susceptibility, and Childhood Asthma." *Environmental Health Perspectives*, Vol. 114, Number 5, May 2006. Viewable at www.ehponline.org/members/2006/8594/8594.html

[36] http://www.epa.gov/swerosps/bf/05grants/losangeles.htm

[37] Interim Environmental Review of the United States-Thailand FTA. Office of the U.S. Trade Representative. November 2005.

[38] *ibid*.

[39]" Reducing Shipping Emissions of Air Pollution—Feasible and Cost-effective Options" Clean Air Task Force et al, viewable at http://www.westcoastdiesel.org/files/clearinghouse-marine//MEPC%20Reduction%20Options.doc.

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[44] "FRA Administrator Announces Start of National Discussion on Improving Safety at Private Highway-Rail Grade Crossings." July 26, 2006, Press Release. Federal Railroad Administration.

[45] "FRA Supports Expanded Use of Toll-Free Emergency Numbers at Highway-Rail Grade Crossing to Improve Safety for Motorists and Rail Passengers." FRA Press Release, June 9, 2006.

[46] Sharing of Track by *Transit and Freight Railroads: Liability and Insurance Issues – Final Report*. Federal Transit Administration. September 2005.

[47] Within the context of FTA's report, the definition of shared track is limited to freight rail and light rail transit, not commuter rail. Commuter rail (a regional passenger rail system) often shares track with freight service, but uses equipment under different safety standards than light rail transit.

[48] *ibid*.